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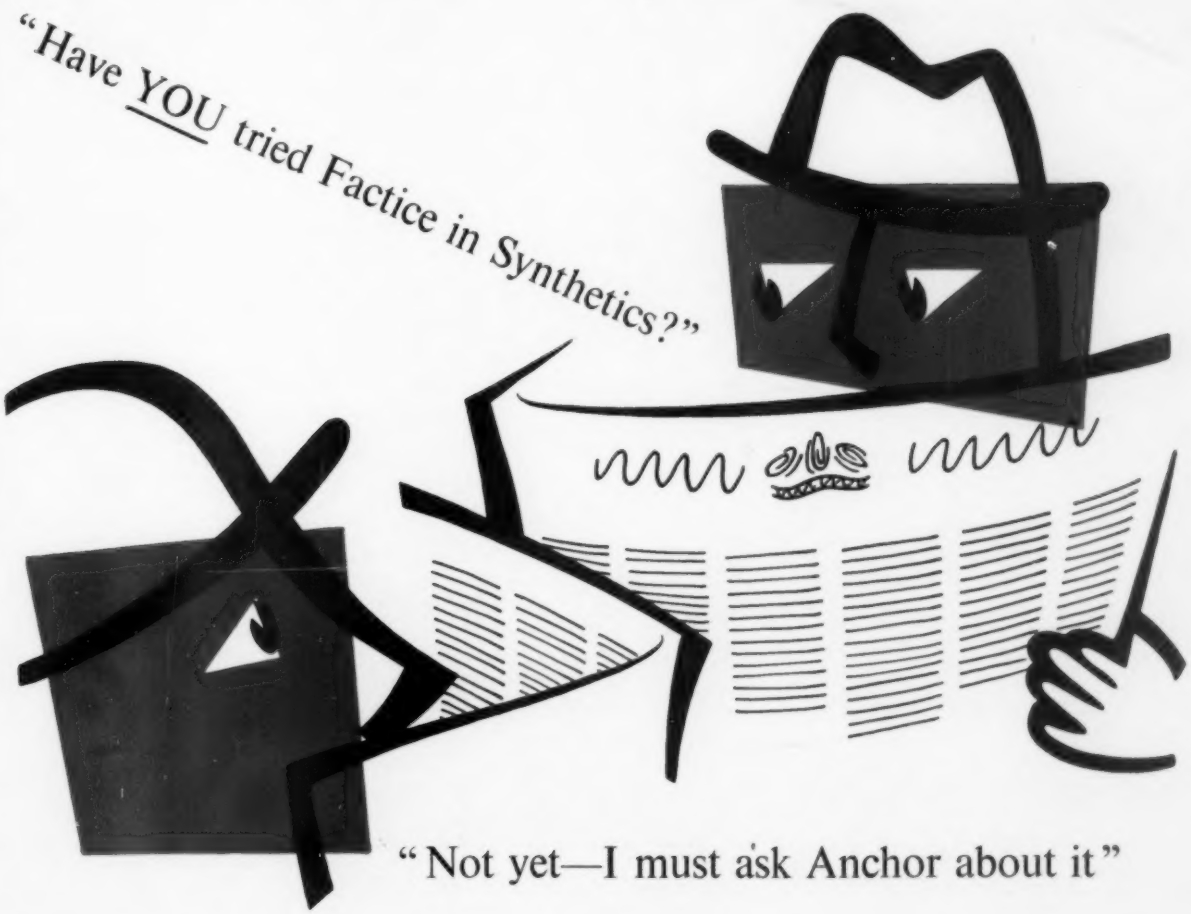

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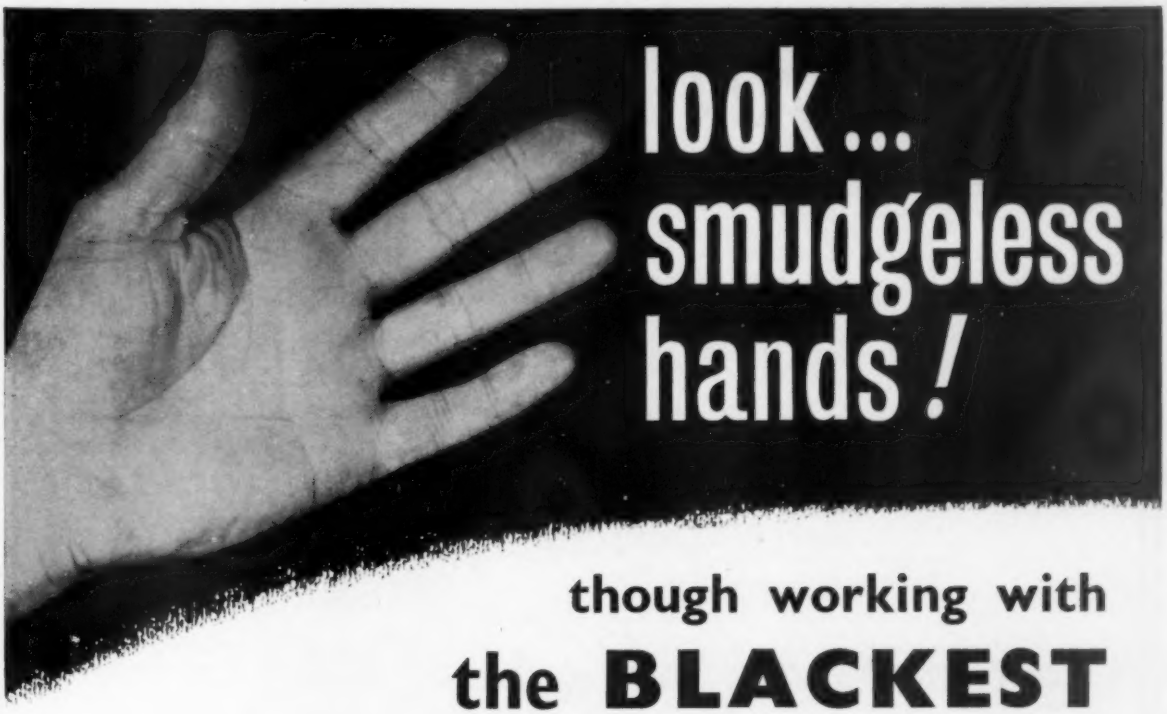

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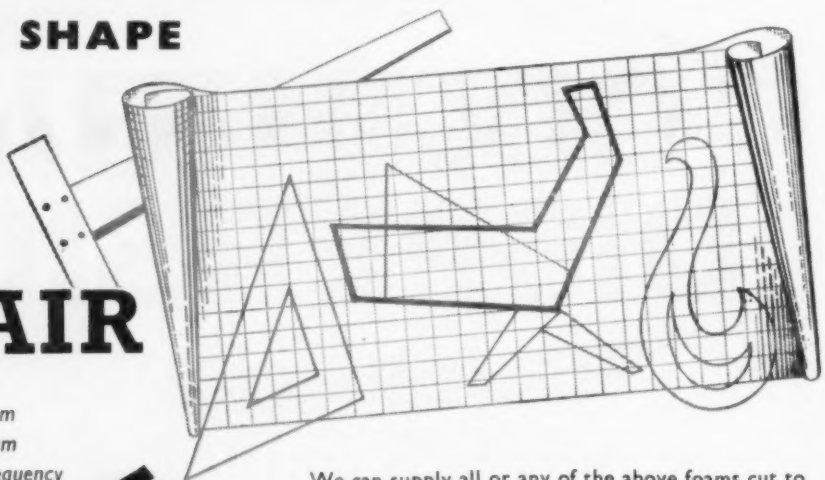

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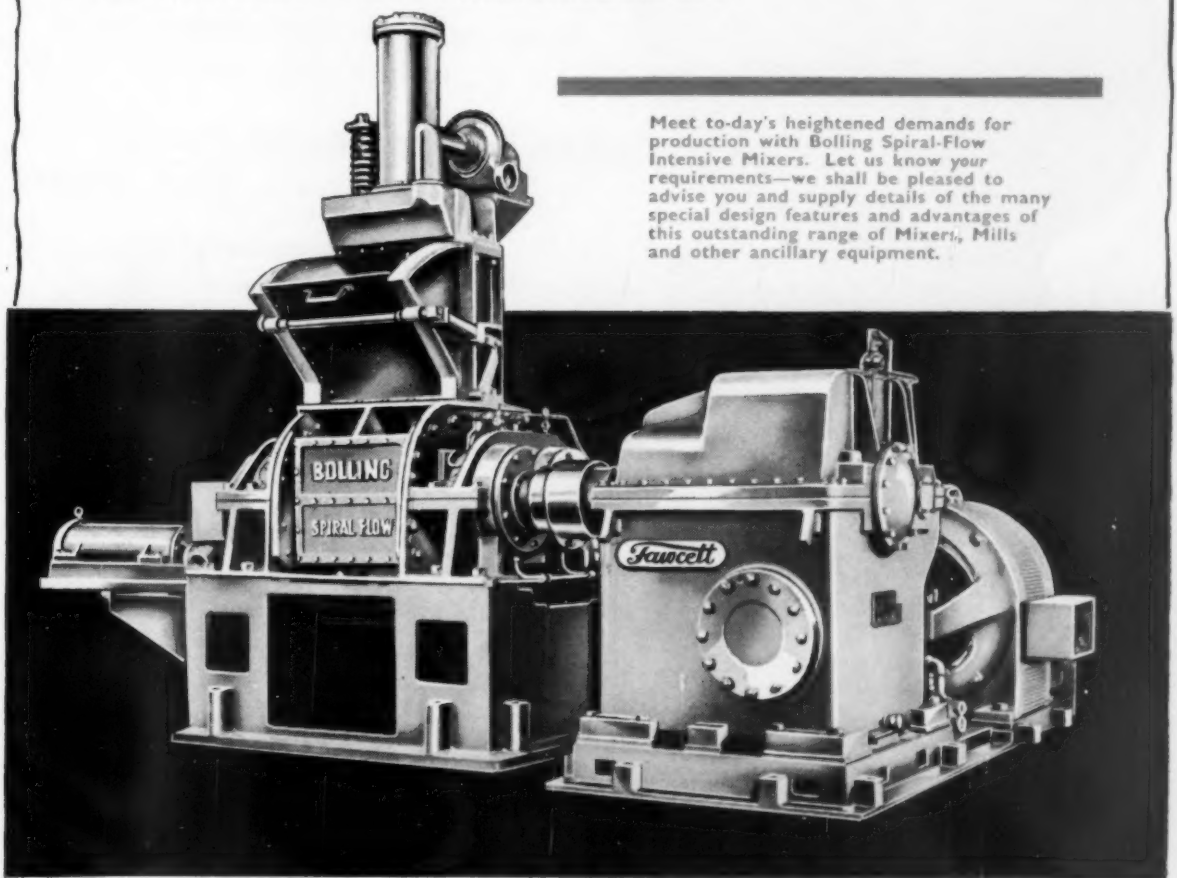

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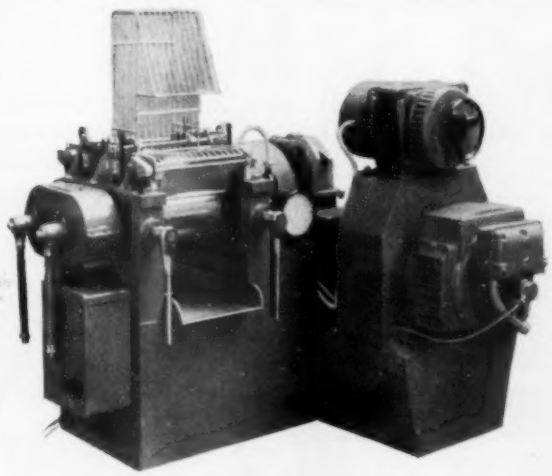

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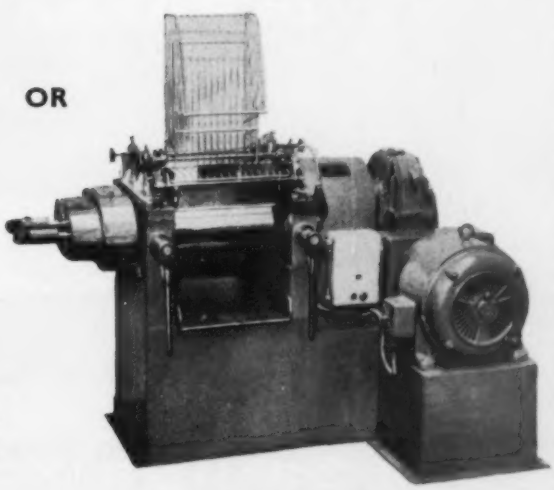

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IN ITS 76th YEAR

May 28 1960

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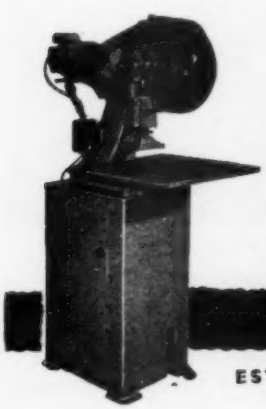

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NOTES of the WEEK

Natural Prospects

THE need for greater supplies of low-cost natural rubber was stressed last week by Mr T. H. Miller, chairman of the Rubber Growers' Association. Such an increase would help the natural rubber industry to attain that essential stability of price, and could achieve this, he thought, without the need for artificial measures such as buffer stocks and marketing board which had been advocated in some quarters. Certainly high prices may bring rubber producers some short-term benefits but they also stimulate further the search for substitutes. Mr Miller said that this might result in the loss of markets in the future. It is, however, clear enough that markets have already been lost. We printed last week an account of the progress of Vitafoam Ltd., which in ten years has grown to be the largest manufacturer of latex foam in Europe. The use of synthetic latex by this company alone is very considerably on the increase and is typical of the trend.

Mr Miller went on to say that it is possible that there may be less tightness in the natural rubber position in 1960 than in 1959.

One reason for this, he said, was that disposals were continuing from the UK and US stockpiles, as well as from the small Italian stockpile. Sales made so far for delivery this year were of the order of 100,000 tons. Another reason was that, unless offtake in Soviet Bloc countries in 1960 was greater than in 1959, it would appear at the moment that the total world demand for natural rubber to be met from new production this year might be somewhat less than last year. Last year it was estimated that Soviet Bloc countries imported some 450,000 tons of natural rubber or about 20,000 more than in 1958. A few months ago the Russians announced they were reducing their stocks of natural rubber by some 50,000 tons. Demand in Communist countries this year would therefore depend to some extent upon whether or not these stocks would be replenished.

Polypropylene Prospect

THE entry of Standard Oil of New Jersey into the polypropylene market—the new Texas plant has a capacity of some 18,000 long tons—approximately doubles current USA capacity for this polymer. Other companies already producing this material in the USA are Hercules Powder Co. and the Avisun Corporation, each with about 9,000 long ton output annually. They will be joined next year by Dow Chemical Co., Eastman Chemical Products Inc., and the Firestone Tyre and Rubber Co. With additional capacity planned by Hercules and Avisun, estimates are that by 1962, productive capacity will reach 134,000 long tons. It is interesting to compare this very considerable figure with US polythene consumption, about 490,000 long tons for 1959 and estimated to reach 535,000 long tons this year—incidentally rather more than the entire sales of all plastics materials in the UK for 1959. In this country, the I.C.I. plant with a capacity of 10,000 long tons, is due to come on stream later this year, and will be joined next year by the new Shell plant, output at present unannounced. If UK consumption of polypropylene is to keep in rough proportion to US usage, consumption here in 1962 would be of the order of 35,000—37,000 tons. However, the polymer has so many uses and potential uses, not least in the wide-open field of packaging, that these figures may well be a good way off the mark.

Twelve-Bore Umbrella

THE Plastics Institute and the Institution of the Rubber Industry do a great deal in the field of education. They provide every encouragement and help for anyone who wants to make a career in polymers. It is hard to imagine either of these bodies saying: 'Don't go in for plastics, it's terribly uncertain'. Or: 'Rubber? Be sensible. There's no future in that!'

Yet that sort of thing can happen. A new careers booklet, on dancing, proclaims discouragingly: 'No one should aim at being a professional dancer, unless convinced that he or she could not be happy in any other profession'. There is a group of people—and this can be said to include dancers—which many of us, at one time or another, would like to join. Artists belong to it, and cricketers and writers and big-game hunters and engine drivers. This urge to be part of an apparently romantic group stays inside us, however small it may become and however far back it may slip into the mind. There are many would-be engine drivers walking about in sedate city clothes. There are many umbrellas that suddenly become twelve-bore shotguns. America, not surprisingly, has been aware of this urge for some time. Apparently a good many American executives fancy themselves as conductors. They sneak away to a mirror when their wives aren't watching, switch on the record player and take Toscanini's place on the rostrum. So one company has brought out a recording of a Beethoven symphony which they are selling packaged with a plastic conductor's baton—or a conductor's plastic baton—and notes on how to conduct. This is billed as a good way of taking exercise, apart from anything else.

There are times when most of us find that our small worlds are depressing in comparison with this imagined romanticism. For these times there is a point of consolation. What, we wonder, do these imagined figures imagine themselves to be when they are depressed? Perhaps they wish they were simple businessmen—like us.

NEWS *Briefs*

PETRO-CHEMICAL COMPETITION IN SPAIN
CEYLON REPLANTING PLAN—HI-TEMP GEON
NATURAL LOSES GROUND—MAN-MADE PAPER

●**Ceylon**—Over 31,000 acres of land will have been replanted with rubber under the Government's subsidized replanting scheme this year, report official sources. Under this scheme—launched in 1953 — about 130,319 acres had been placed under rubber at the end of last year. It is estimated that by 1962 the total area replanted under the scheme will amount to 200,000 acres.

●**United States** — A new high-strength vinyl plastic said to be suitable for piping liquids up to 200°F. has been announced by B. F. Goodrich Chemical Co. Known as Hi-Temp Geon, the new material is termed by Goodrich Division the 'first significant breakthrough . . . since the development of the first rigid vinyl plastic twelve years ago.' Principal use for the material, now in pilot-plant production, was expected to be pipe for household hot-water plumbing and industrial hot-acid applications.

●**Canada**—The first tonnage of crude rubber to be brought into Great Lake ports by steamship arrived at Toronto over the weekend, after a two month trip from Singapore. The shipment is the first in a series of tests to determine costs and feasibility of using the St. Lawrence Seaway. Four major companies are co-operating in the study through the Rubber Manufacturers' Association.

●**Germany** — A German firm is reported to be the first enterprise in the world to be successful in making a synthetic paper with an art print stripe. The formation of the stripes is exactly as used for normal paper production, but the paper is made entirely of man-made fibres.

●**United Kingdom**—Natural rubber lost 2.6% of the market to synthetic in the first quarter of this year. This is shown by figures from the International Rubber Study Group, comparing this period to the same period in 1959.

●**Canada**—Polymer Corporation Ltd. Sarnia, Ontario, has announced the conclusion of an agreement with Petroleos Mexicanos under which Polymer will provide technical assistance and advise for the design and construction of a plant to produce general purpose copolymer type rubber. The plant will be located at Tampico and will use raw materials from Petroleos Mexicano's new refinery at Madero.

●**United States** — Rejected applications for export to the Soviet bloc in the first quarter of 1960 totalled $7,175,151, compared with $1,427,630 in the previous quarter. The rejected applications included $111,140 worth of synthetic rubber and $14,806 worth of pneumatic tyres and casings for the Soviet Union and $116,000 worth of synthetic rubber to Czechoslovakia and Hungary. An application for the export to Poland of $50,624 worth of synthetic rubber was granted.

●**United Kingdom**—Output of man-made fibres during April established a new record for the month. Production of 49,290,000lb. was over 12m. lb. higher than in April last year. Over the first four months of the year total output increased by nearly 45m. lb. compared with 1959, the respective figures being 205,010,000 lb. and 160,340,000lb.

●**United States** — Expansion of facilities for the production of Nadic methyl anhydride, a liquid epoxy curing agent, has been announced by Allied Chemical, New York, available to markets abroad through Allied Chemical International. A 23 cents per lb. reduction in the price of the company's succinic anhydride has also been announced; the price now being 51 cents per lb.

●**United Kingdom** — Believed to be the first publication of its type produced by any British chemical manufacturer is a technical bulletin on rubber chemicals, 'Monsanto Hianqpyi Huahshyue Piin,' produced by Monsanto Chemicals Ltd. Designed and printed in Singapore, the booklet uses an idiom acceptable in Singapore, Hong Kong, Taiwan (Formosa) and South Korea.

●**Spain**—A number of proposals for the setting up of a petro-chemical plant are under active consideration by the Government. Proposals are by: Union Quimica del Norte in conjunction with Dow Chemical; Compania Española de Petroleos in conjunction with Esso; Union Española de Explosivos in conjunction with Royal Dutch - Shell; the State - sponsored National Institute of Industry. The last proposal is said to be the most ambitious, involving a plant 150 miles inland from Malaga, with which port it would be connected by pipeline.

'Say what you like, but he don't look much like the I.C.I. representative to me!'—486

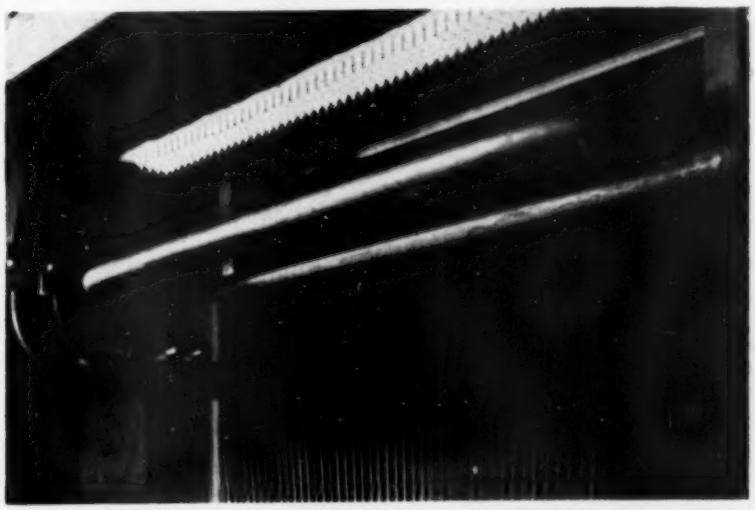
New High Temperature Material

DEVELOPMENTS BY MICROCELL

AT the official opening on May 20 of the new factories for Glass Yarns and Deeside Fabrics Ltd. and Artrite Resins Ltd., both members of the Microcell Group, the Rt. Hon. Harold Watkinson, M.P., Minister of Defence, made reference to dramatic new processes and projects pioneered in the factory at Camberley and a statement amplifying this was made later by Dr G. Ader, who is in charge of research at Artrite Resins.

Dr Ader spoke of the increasing demand for plastics materials stable with ceramic materials. This material was made by the same methods as are associated with plastics.

A demonstration of the material was arranged showing a thin sample supporting a 500g weight while at a temperature of 400-500°C., and another sample was unaffected by squirting with cold water while red hot from exposure to the flame of a gas torch estimated to be at a temperature of 800-1,000°C. A ceramic under similar conditions would undoubtedly have cracked badly.



Close-up of an electrically heated furnace at the new Glass Yarns plant, from which the molten glass is drawn into very fine fibres. The individual fibres are combined into a strand and wound into a 'cake' on a machine below the furnace

at higher temperatures arising from the needs of high speed aircraft, rockets and missiles. Research work in the field of pure chemistry had been carried out in the laboratories at Artrite and had met with some success, opening up new possibilities. Materials had been made in the laboratories which could be processed by methods commonly in use with thermosetting moulding materials such as phenolics but which were stable at temperatures up to 600°C. New fibre forming materials had also been made which were intermediate in properties between glass and the man-made fibres such as Terylene and nylon.

The most interesting development however was the successful production of a material bridging the gap between plastics and ceramics, being able to withstand temperatures of 1,000°C. without the disadvantages of weakness and brittleness associated

Samples of moulding powder were also on show, from which the test pieces were made by normal techniques. These test pieces which were about 3in. x 1in. x 0.1in. were the only mouldings so far produced, and Dr Ader emphasized that they were so far only very much at the laboratory stage and were not commercially available. He was not prepared to divulge any information on the chemistry of these new polymers, patent applications for which had been made, and would not say whether they were inorganic or organic.

It is possible that this represents an advance in the chemistry of boron compounds which have been used successfully in the past as a starting point in the search for high temperature stable materials, and one form of the moulding material displayed was very similar to the borax beads familiar to the analytical chemist.

The cost of these polymers, said Dr Ader, was not likely to be very much greater than that of thermosetting materials now available, and if it proves possible to produce them on a commercial scale this would represent an important break-through in plastics progress, and could open up many new fields for the use of plastics ranging from domestic cookers to space-ships.

Plans for Nylon Expansion

The first phase of the Gloucester factory of British Nylon Spinners is now coming into production and will provide increasing supplies of type 66 nylon textile and industrial yarns. Furthermore, a decision has now been made to proceed with the second phase of expansion. This phase will include further provision for the industrial yarn market, including tyres, and will be in type 6 nylon.

BNS say that type 66 nylon has advantages for arduous conditions of tyre usage and they are increasing production of a new heat-resistant type 66 yarn for tyres. At the same time, they add, nylon 6 will have entirely satisfactory properties for most of the general tyre market and, in addition, will show some advantage in the large scale spinning of heavy industrial yarns. The new nylon 6 plant is planned to begin production in about 15 months' time.

Japanese Rubber Footwear Nips US Industry

Representatives of the American rubber footwear industry have complained to Government officials that imports from Japan were 'skyrocketing.' They said that they would approach the Tariff Commission for relief.

The industry representatives, as well as trade union spokesmen, discussing the problem with Government officials at a meeting said that Japanese imports sold at retail on the American market at about half the price of US produced canvas top and all-rubber footwear.

An industry representative said that overall imports of these goods in the first quarter of 1960 had exceeded domestic production for the first time in history. It would not be long before cheap Japanese imports wiped out the American industry, it was added.

Michelin have knocked down the price of their 0.20-type 'X' tyre by more than £3—from £45 16s. 6d. to £42 8s. This mono-ply steel-cord giant has a load-carrying capacity of 51cwt.

IRI Foundation Lecture Dinner

THE INDUSTRY FLOCKS TO MANCHESTER

THE dinner held by the Institution of the Rubber Industry on the occasion of the Annual Foundation Lecture took place at the Midland Hotel, Manchester, on May 20. Some 250 people were received by the president of the IRI, Sir John Dean, and Lady Dean and by the chairman of the IRI Manchester Section, Mr J. M. Buist, and Mrs Buist.

At the Foundation Lecture given earlier in the evening, the packed audience in the Library Theatre heard Mr Maldwyn Jones, Development Director of the I.C.I. Plastics Division, give the 15th lecture in the series. His subject was 'High Polymers; A Story of An Age in Principle and Practice' (a summary of the lecture appeared in *RJIP* May 21 1960). Mr Maldwyn Jones was introduced by Sir John Dean, after the meeting had been opened by Mr J. M. Buist.

The Foundation Lecturer

At the dinner which followed, Sir John Dean presided. The toast of the Foundation Lecturer was proposed by Mr J. M. Buist. May, said Mr Buist, had been a great month for the Jones, both for Jones the Photo and Jones the Plastic. This was one of the occasions when the Institution met to honour one of its members who earlier in the day had delivered the Foundation Lecture. It was an important event in the IRI Calendar and they were honoured that the president of the Institution, Sir John Dean, was presiding. That night, he went on, was quite exceptional. In fact, he doubted whether they had ever had such a dense gathering at a Foundation Lecture Dinner.

Mr Buist quoted:

> The art of Biography
> Is different from Geography
> Geography is about maps
> But Biography is about chaps

Tonight they were concerned with Maldwyn Jones and to those of us in Manchester it came as no surprise that Mr Jones had shaped his lecture with skill, executed his demonstrations with dexterity, and shed light on a wide range of polymers with practised perspicacity. After all he had graduated in Manchester in 1927, migrated to Birmingham where he joined the Dunlop Rubber Co., and returned to Manchester in 1930 when he joined I.C.I. Ltd. in the Rubber and Resins Service Department at Blackley. He did not propose to recite his life story for that was too often a magnification of an entry in Who's Who in the Rubber Industry. In thinking of Maldwyn Jones it was enough for them that one day he entered the rubber industry. The experience gained with the Dunlop Rubber Co. was utilized and enlarged when he moved to the chemical industry where he played a prominent part, along with Dr Naunton, in developing rubber chemicals and also in introducing synthetic rubber into this country in the late 1930's. 'I met Mr Jones first in 1940 and he did a great deal to guide my first faltering steps in the mixed up industrial life into which I had been directed. I shall always be grateful to him for the kindly help and assistance he gave me.'

In 1944 Maldwyn left Blackley for the south and devoted the next few years to work on plastics. He maintained his interest in rubber and continued to be a powerful advocate of synthetic rubber being produced in this country. In due course his wish was granted and he had the responsibility for development in a division of I.C.I. which has one foot firmly planted in the plastics field and the other firmly planted in the synthetic rubber field.

'So strangely is human nature fashioned,' concluded Mr Buist, 'that for few men is reserved the satisfaction, the supreme honour, of knowing that their work has been weighed in the balance and found good; when they see the scales of judgment tilt in their favour their happiness and reward must be great. Certainly that is our wish to Maldwyn Jones this evening.'

Maldwyn Jones Replies

Replying, Mr Maldwyn Jones said he wanted to express his thanks for the generous reception accorded him and for the honour of giving the 15th Foundation Lecture. Little did he think, he said, that he would ever give a Foundation Lecture. He had attended all the previous 14 and he knew there was ample precedent for the Foundation Lecturer to reminisce.

His first job in the rubber industry had been with the Dunlop Rubber Co. Ltd. He had arrived before they had quite decided what to do with him. While the decision was being made he had been asked to put the department's name on a dozen scrubbing brushes — 'Milling and Processing Department.' This he had done. At that time, he went on, he and those with him—several of whom were present—had started what was in effect modern industrial control; with stop watch, thermometer and knife. It was the finest training he could have had in rubber technology and human relationships.

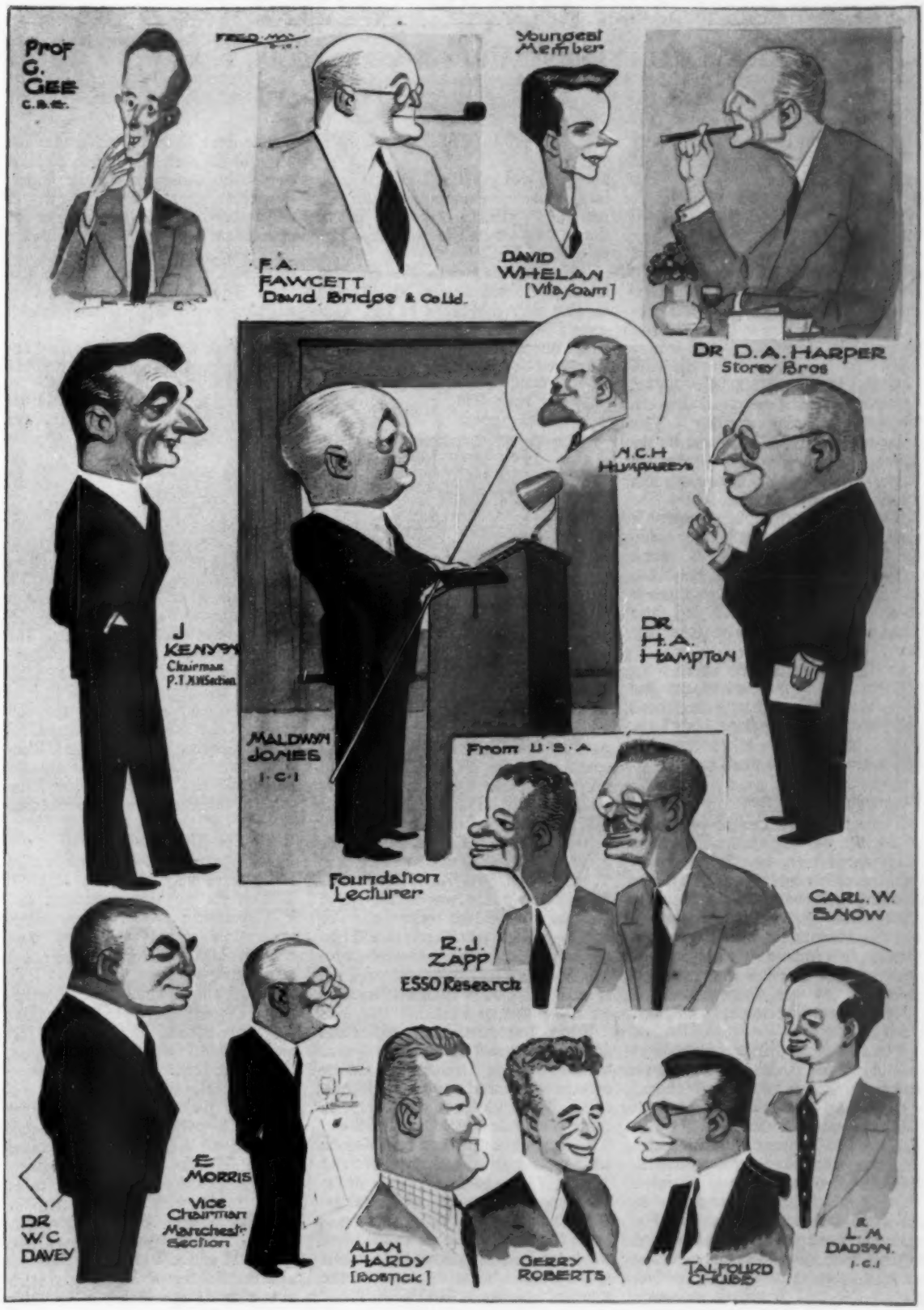
From there he had gone to I.C.I. Ltd., at Blackley, in the rubber service department. He was, incidentally, the third Foundation Lecturer from that department, following Dr Naunton—who he was delighted to see present that evening—and J. M. Buist. The days at Blackley had been stimulating and alive, ideal in his opinion for research. He went on to refer to the time when Dr Naunton received the first sample of synthetic rubber ever seen in the UK. There had, he said, been some argument as to who, he or Dr Naunton, was to ruin the precious 20g. However, from that day in 1933, there had been at least two strong advocates of synthetic rubber. In fact, had the work been followed up, it could have altered the whole story of synthetic rubber in this country.

Mr E. Morris, vice-chairman of the Manchester Section IRI, proposing the toast of the guests, said they were very pleased to see Maldwyn Jones for so long a member of the Section, and Mrs Jones on this memorable occasion. He also extended a warm welcome to their old friend Dr Naunton, to Mr J. Kenyon, newly elected chairman of the Plastics Institute North Western Section, to Professor Gee, and to the ladies.

It was becoming more apparent than ever, he went on, that natural rubber, synthetic rubber and plastics be considered together and as complementary materials. He was sure that moves now being made towards a closer association between the IRI and the PI would prove to be of advantage in many ways, including the academic and technical training of young personnel.

Professor G. Gee, in an apt and amusing speech, responded on behalf of the guests.

AT THE IRI FOUNDATION LECTURE AND DINNER

by Fred May

Plastics in Cables

PART 5: POLYTHENE AND MISCELLANEOUS PLASTICS

(Concluded from May 21 issue, page 782)

By W. S. PENN, B.Sc.

APART from PVC, polythene is by far the most important plastic used in the cable industry. The material has developed side by side with PVC cables which it has replaced for a number of purposes.

As far as consumption is concerned it is difficult to be precise for the UK. In the USA however, the consumption for cables was 14,300 tons in 1953, 26,300 tons in 1956 and this figure has increased considerably since. At the moment in the UK probably between 5,000 and 10,000 tons per year is being used and the figure is growing steadily. This increased demand is being met by the increased capacity made available due to the entry of several companies into the field apart from I.C.I. Ltd.

The usage in the cable industry is already quite high and is growing continuously. There will be some competition between PVC, polythene and the newer materials, but there is no doubt that they will all find their place in the industry on an increasing scale.

In the present article apart from polythene, it is proposed to consider high density polythene, irradiated polythene, polypropylene, nylon, PTFE and a few other materials which are used on a small scale.

Properties of Polythene

There are a number of properties of polythene which make it a first-class material for use in the cable industry. First and foremost are the electrical characteristics, since the power factor and capacitance are low and the insulation resistance is high. Usually, it is impossible with standard equipment to measure the insulation resistance of polythene insulated cables, the reading normally obtained being infinity.

The second most important characteristic of polythene is its moisture resistance. This is extremely high and some typical figures compared with PVC and natural rubber are given in Table 1. This means that the cables are extremely suited for use in conditions of high humidity or in water.

Many of the other properties of polythene are most satisfactory. For example, ozone resistance is good and weathering is satisfactory provided the material contains at least 2% carbon black. Oil and chemical resistance are good and polythene is frequently used in corrosive atmospheres for this reason. Polythene, of course, is not flame resistant and in this respect is inferior to PVC.

The processing properties are very satisfactory, and it can be extruded to give very thin walls at very high speeds. Like PVC it also allows a wide range of pastel colours to be employed for identification purposes.

TABLE 1
MOISTURE ABSORPTION OF POLYTHENES

Polythene Type	Melt Index B.S. 1973	Absorption (mg./sq. in. surface)
Low density, high pressure..	2	0.88
Low density, high pressure..	7	0.28
High density, high pressure..	1	2.00
High density, low pressure..	2	2.00
GP PVC insulation	–	8.00
BS 2899 insulation	–	20.00

As far as cost is concerned, it is a fairly competitive material. It has a low specific gravity which is of great advantage in the cable industry and the recent price reductions give it about the same cost as PVC compounds on a volume basis.

Material Specifications

There is no British Standard corresponding to BS2746, the material specification for PVC. The standard polythene cable specification corresponding with BS2004 for PVC is BS1557. There is a brief reference to the material which states that the grade number shall not be softer than 7 and that polyisobutylene may be added to the extent of 12½%. A suitable antioxidant must also be added. This specification will be revised in due course and probably a harder grade of polythene will be specified and butyl rubber allowed as an alternative to PIB.

There are material specifications available for polythene, both issued by Government Departments. First may be mentioned the GPO Specification M112A. This requires polythene with melt flow indexes of 2 and 0.3. Again butyl rubber may also be added, 10% for the softer grade and 5% for the harder grade. It is necessary to compound all polythene with an antioxidant, and provision is made for the addition of carbon black when required. A colour code is also specified, this being the same as the standard colours in BS2782.

The Post Office Specification has tests for the melt flow index, physical properties, density, electrical properties, the light and water fastness of the colours, tests to ensure that the antioxidant is present, and perhaps the most important, a test to check the dispersion of the carbon black where used. There is also an environmental cracking test considered later in this article.

The melt flow index is carried out according to the method in BS2782 Part I. The equipment is essentially an extrusion plastometer with an orifice 0.32in. long and 0.082in. diameter at a temperature of 190°C. and under a pressure of 43.2lb. per sq. in. The melt flow index is the amount of material extruded in 10 minutes under these conditions, and has an empirical relationship with the viscosity of the polythene molecules.

The Government Department Electrical Specification No. 27 is also for polythene and is similar in some ways to the Post Office Specification.

Cable Specifications

The primary cable specification for general purpose use is BS1557. This is for polythene insulated and PVC sheathed cables. These cables are mainly of the wiring type used extensively for all sorts of home and commercial purposes.

There are a number of Government Department Specifications for polythene cables. DEF10, DEF12B and DEF14A are typical examples. The first two are for miniature electric cables of various kinds and the latter for radio frequency cables for which polythene is well suited.

There are numerous specifications for the GPO incorporating polythene, a large quantity of telephone cable being made with this material as well as coaxial cables of various types. Typical specifications are CW128H and CW154.

The Ministry of Supply also have a number of specifications including

polythene of which EL1982 for miniature electric cables is an example.

As would be expected there are a number of foreign specifications for polythene. A typical example is one for black polythene sheathing in IPCEA Specification No. S-19-81.

Polythene in Cables

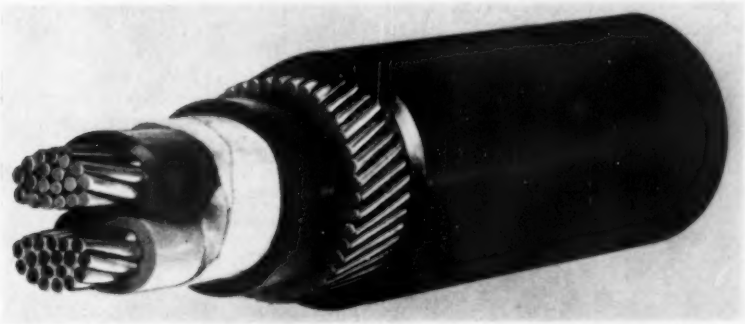
Polythene is used in a wide variety of cables about which it is interesting to consider the merits and demerits.

As far as insulation is concerned polythene is almost an ideal insulant for many purposes. One of its biggest defects, however, is its sharp melting point which is likely to occur from about 109°C. upwards. This has caused complaints where polythene insulated cables have been taken into totally enclosed lamps, the temperature inside which is frequently 160°C. or higher, and it is not therefore surprising that the polythene has melted.

70°C. which is a slight handicap for the equivalent paper cables operate at 80°C. More important however, is the fact that in processing it is difficult to apply polythene to a shaped conductor, primarily because unlike PVC it does not form a suitable tube which can be pulled down by vacuum on to the conductor. The formation of voids offers certain limitations to the use of polythene for high voltage cables.

Mechanical Properties

Unlike PVC there is little scope for the compounding of polythene. There is some choice of the grade, and whereas not very long ago Grade 7 was commonly used in cables this has now been virtually replaced by Grade 2. For some purposes even lower grades are employed and if any difficulties are experienced with extrusion due to these harder materials then a proportion of PIB or butyl rubber may be employed.



Johnson and Phillips

Fig. 10.—PVC-insulated, polythene-sheathed cable

Polythene is used extensively for radio frequency cables as well as submarine cables where the low loss characteristics are of great importance. The insulant is ideal for the purpose, but it is not always easy to apply. In spite of the considerable amount of research work undertaken into the formation of voids in polythene, the problem has not been entirely solved.

The problem is that when polythene (usually in sections thicker than 0.1in.) is cooled rapidly internal voids are likely to form which will cause electrical breakdowns. The best way of overcoming the trouble is to employ graded cooling where the polythene cable passes through a warm zone followed by several cooler zones down to cold water. Some elaborate equipment has been designed for this purpose.

It might be thought that polythene would be an ideal material for power and high voltage cables. In the first place, for power cables, its maximum operating temperature is limited to

Polythene oxidizes rapidly at operating temperatures and suitable antioxidants must be added. It is preferable to purchase these in masterbatch form from the suppliers, blend in a tumbler and feed to the extruder in this way. Colours are similarly added in masterbatch form.

If polythene is to be exposed to sunlight it will suffer rapid degradation unless suitably protected. The only satisfactory way of doing this is to add 2% carbon black. It is essential to obtain very good dispersion and most specifications have tests for this. Again it is preferable to make or purchase a masterbatch and add with the other materials.

As far as processing is concerned details of this have already been given in Article No. 4. It is not normally possible to print on polythene because of its poor wetting properties so that it is usually indented or embossed with a wheel for identification.

For some time polythene was regarded as an insulant only. It was considered that it was not robust enough to be used for sheathing. Consequently, only in those cases where the moisture resistance had to be really good was a polythene sheath used.

Although many companies are conservative about using polythene sheaths, there is no doubt that they are coming more in favour. One or two companies have installed a considerable amount of polythene sheathed cable without trouble, so that this will undoubtedly encourage others to follow suit. The movement from Type 7 to Type 2 polythene will undoubtedly help in this connexion. In the meantime, quite big cables have been covered with polythene and the tendency will undoubtedly spread.

Other Polyolefines

The high density polythenes are likely to find outlets in the cable industry. There are two types which cable manufacturers are being asked to consider, namely the high pressure, high density materials (SG 0.94) and the low pressure, high density materials (SG 0.95). As far as cables are concerned the primary advantage is the higher softening point where the use of polythene is extended from 70°C. to about 85°C. for continuous operation. As with other high temperature materials this means that current ratings can be increased over conventional types.

It is difficult to make a choice between the different high density materials available. One important criterion is that of 'stress' or environmental cracking of the material and methods have been developed to study this phenomenon. The method consists basically in taking a strip of moulded polythene of specified dimensions having a controlled imperfection in one face and bending it to a given radius. It is then immersed in a suitable solution and maintained at an elevated temperature, and the time for cracking to develop noted. Table 2 gives details of some tests which were carried out in this manner employing Lissapol NX, made at a constant temperature of 50°C. It should be stressed that the test is very sensitive indeed to minor variations of test conditions, and it is quite possible to reverse results so that the information given must be treated with considerable caution.

Bearing these limitations in mind the general conclusions which may be reached are that at a given melt index the low density polythene is better than the high density and that the lower the melt index in the case of both types the better the result.

As far as mechanical properties are

concerned it is interesting to note the difference between the high density polythenes produced by the high and low pressure processes. The elongation of the low pressure material is extremely low and that of the high pressure material is normal. The elongation can, of course, be varied with the rate of stress, but with the low pressure process elongations of the order of 20% to 50% are obtained, and with the high pressure materials 180% to 500% are obtained.

TABLE 2
ENVIRONMENTAL CRACKING OF POLYTHENES

Density	Process	Melt Index BS 1973	Time to Crack (hours)
High ..	Low pressure	2	45
Low ..	High pressure	7	433
High ..	High pressure	1	471
Low ..	High pressure	0.2	1,200 } unbroken
High ..	Low pressure	0.2	1,200 }

What the low elongation figures and the low values for the stress cracking mean in practice is difficult to say. It would clearly be prudent however, particularly in the case of the stress cracking, to use the material with a low melt index.

As far as processing is concerned, reasonable speeds can be obtained with some grades of material. An excellent finish is produced and there is little doubt that the materials are first-class products with a promising future in cables.

Irradiated polythene is one of the latest additions to the cablemaking range. Actually, it is quite a different material to polythene and exhibits rubber-like elasticity at elevated temperatures. Since it has no softening point it may be considered as a cable insulant for temperatures up to 200°C. or more. Its electrical characteristics are virtually the same as normal polythene.

The difficulty with irradiated polythene is that it is more susceptible to oxidation than the normal polymer which itself needs antioxidant protection. This means that its continuous operating temperature is restricted by available antioxidant limitations and possibly 100°C. is the limiting temperature. However, for short time applications the material can be used at the higher temperatures and for the time being this is likely to be one of its major outlets. The cross-linking brought about by irradiation also results in improved hydrocarbon oil resistance which may be of some value.

As far as processing is concerned there are two principal methods which may be considered at the moment. The first is the continuous irradiation of a rotating polythene covered conductor, but the expense of necessary plant is considerable. The other method is to irradiate polythene tapes and lap these on to a conductor to form the insulation.

The latest material to appear on the market is polypropylene. When originally introduced it was regarded as very suitable for the cable industry at temperatures up to 120°C. or even higher. It has subsequently been found that although for many purposes polypropylene is suitable for operation at these temperatures in the cable industry, a catalytic reaction takes place when the material is in contact with conductors. The polypropylene is rapidly degraded and so far a suitable antioxidant has not been found to counteract this reaction. Great caution should, therefore, be adopted in using polypropylene in cables. It can still be used up to temperatures around 100°C., but this should be investigated or the suppliers consulted before any move is made. The work so far carried out indicates that it extrudes perfectly satisfactorily and from all other points of view except the above is likely to be a very useful material for the cable industry.

PTFE

PTFE has been used with some success for a number of years in cables. Its primary application has been in aircraft although its consumption is still comparatively small. Since its inception however, the price has been lowered and this is stimulating demand. PTFE is used on magnet wires, in high energy ignition cables, in situations where high temperatures are likely to be experienced such as thermocouple leads in some radio frequency cable and so on. Its outstanding characteristic is, of course, its ability to withstand temperatures of −75°C. to 250°C. which extends it well beyond the range of silicone rubber. It also has good dielectric properties and complete resistance to fluids which is so important in many aircraft applications. Cables can be made in several ways. Granular polymers may be used with reasonable success in semi-conventional plastic extruders, although speeds are very slow. Dispersion polymers may be employed with ram extruders and higher speeds obtained, but modern equipment is expensive. Here a lubricant is employed which must be flashed off and the product finally sintered. In both methods any possibility of contamination should be rigidly excluded. Alternatively, unsintered tapes can be spiralled on to wires and subsequently sintered. Fully sintered tapes may also be employed for special cables. An interesting development is the use of coated glass yarns which can be braided to give a very resistant finish to solvents and heat. Several accounts of the methods have been given.

Polytrifluorchlorethylene may also be mentioned in passing. On theoretical grounds it would appear to have easier extrusion characteristics than PTFE but it does not seem to have found favour in the UK possibly due to the special metals required for equipment.

Other Conventional Materials

There are quite a number of other synthetic materials which are used in one form or another in the cable industry and have been for some time. Various lacquers, for example, of the vinyl, cellulose acetate or cellulose acetate-butyrate types have been employed for many years as outer protective coverings usually associated with glass or textile braids. Properties required are fluid resistance, flex resistance, frequently flame resistance, apart from general mechanical properties and adhesion to the braid.

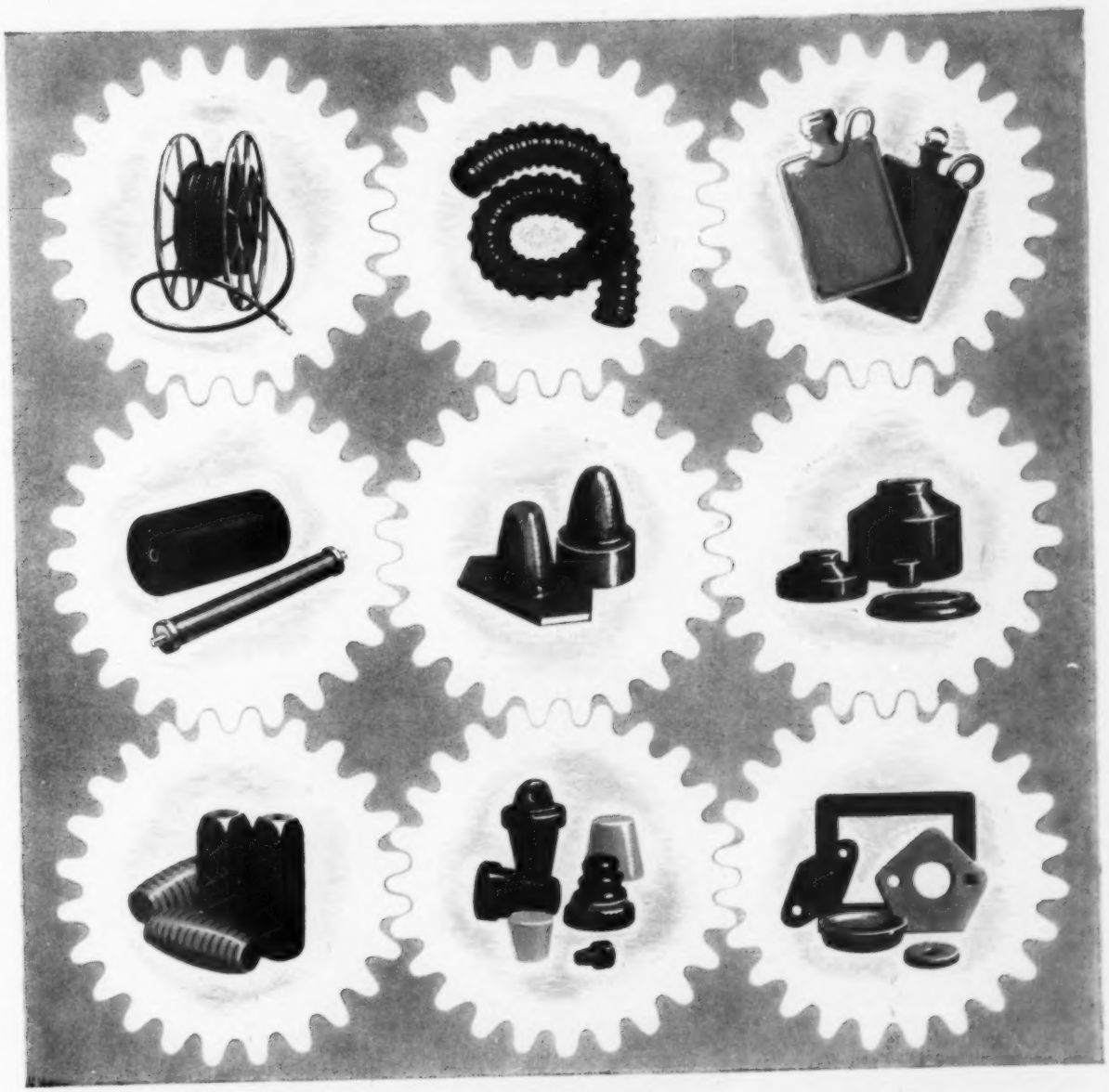
Nylon has been used for some time because of its toughness or its fluid resistance, and there is a tendency for its use to increase as a tough sheath for rubber or PVC cores. It may be extruded satisfactorily with suitable extruders although as a sheath on larger sizes of cables it is unsatisfactory because of its tendency to 'pucker.' Before extrusion, the nylon must be carefully guarded against moisture contamination or great difficulties will be experienced. On larger sizes the finish has now been changed to nylon braid and nylon lacquer. Nylon yarns are also used in cable manufacture particularly in copper/nylon screens for trailing cables for coal mines.

Terylene has some uses, particularly as a film in tape form and as a varnished terylene braided tape. The former is used as a barrier tape to prevent migration of undesirable materials to the insulation and the latter is used as insulation.

Conclusions

The use of plastics in the cable industry has already overtaken the use of rubber-like materials. That the tendency will continue, and continue rapidly is not to be doubted. New equipment is rapidly being installed by

Continued on page 802



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Polypropylene Film Made in UK

EXTRUDED BY BRITISH VISQUEEN

POLYPROPYLENE film is now being produced in this country for the first time by British Visqueen Ltd., Stevenage, Herts., an I.C.I. subsidiary company. The film is being extruded as continuous unoriented sheeting from 'Propathene' granules supplied by I.C.I. Rolls are being produced in widths up to 36in. and in thicknesses ranging from 0.0005-0.005in., and British Visqueen say that comprehensive technical information is also available.

The company gives a résumé of the advantages of polypropylene over polythene film: higher melting and softening temperatures; better clarity; superior oil resistance; lower gas permeability; greater stiffness; greater tensile and yield strength and freedom from stress cracking.

Packaging Applications

Polypropylene film melts at 170°C. and can be used under stress up to 100°C.-120°C. This should mean that 'boil-in-the-bag' foodstuffs packs and surgical sterilization packs will prove important applications.

It is likely, too, to find considerable uses as a material for textile packaging and overwrapping; oily machine parts, foodstuffs containing fats or greases and lubricating oils may safely be packaged in polypropylene film. It should also be suitable for packaging soaps and detergents, because of its resistance to stress cracking.

The February issue of the European Technical Digests (HMSO) contains an article on mechanical aids for the hot-working of thermoplastics. This describes some simple tools and machines for small scale work with thermoplastics.

PLANT REDUCTION

The Industrial Rayon Corporation is planning a 'substantial reduction' in production and employment at its Cleveland tyre cord plant, company sources revealed.

A spokesman for the company said the plant would continue to operate but on a very small production basis.

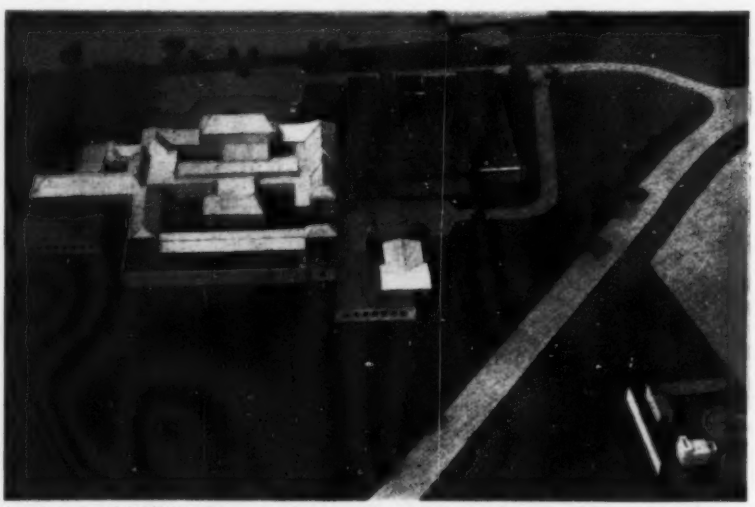
Operations already have been curtailed during the last few months and employment has been cut to 600 from 1,000. The new cutback will involve layoff of 'several hundred' more employees, the spokesman added.

The Columbian Carbon Co., New York, has elected two new officers. Mr George P. Bunn, jnr., has been elected vice-president and Mr Harry D. Page secretary of the company.

RABRM 40th AGM

Speaking at the fortieth annual general meeting of the Research Association of British Rubber Manufacturers, Mr D. B. Collett, chairman of the council said that the financial difficulties which had persisted in recent years had now been largely resolved. Thanks to this improvement he said, it would now be possible to go ahead with the council's plans for extension of the Shawbury buildings and equipment, and to employ more staff. Models of the proposed extensions were explained to the meeting by Dr W. F. Watson.

The extensions which would cost £60,000 financed from present RABRM sources, had been planned to fit in with further extensions which would be necessary if Shawbury became the research association of a joint plastics and rubber association. Mr Collett spoke of the activities at Shawbury, and the attempt to get out and meet as many members as possible which had met with great appreciation. Many visitors from home and overseas had been received at Shawbury, and this had strengthened the ties between the staff of the association and the member firms with consequent mutual advantages.



Model of RABRM laboratories at Shawbury. Lighter areas are existing buildings, darker areas show proposed extensions which will house increased facilities, including machinery for research on plastics

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S. D. Sutton (Veedip Ltd.) has been re-elected chairman of the British Seamless Rubber and Plastics Manufacturers' Association. Vice-chairman is again A. R. Reid (London Rubber).

PLASTICS IN CABLES

Continued from page 800

a number of companies, and no doubt this will continue as the demand increases. In the field of plastics PVC is certainly the most important material. From many points of view it is the simplest to process and since there is very little difference in the cost between PVC and polythene it is likely to continue to hold the field. Nevertheless, the role of polythene in the cable industry is an important one. It is the only satisfactory material for radio frequency cables and this field is expanding rapidly. Perhaps the growth of polythene in ordinary cables is likely to be slower, but a big increase in its use in sheaths may be expected. The use of plastics in the cable industry is flourishing. No manufacturer can afford to ignore the progress which is taking place both with conventional materials and the newer types which are coming along. Unless he keeps abreast of these materials, whether they be radical changes to the type of polymer or comparatively minor changes to increase output, he will not survive.

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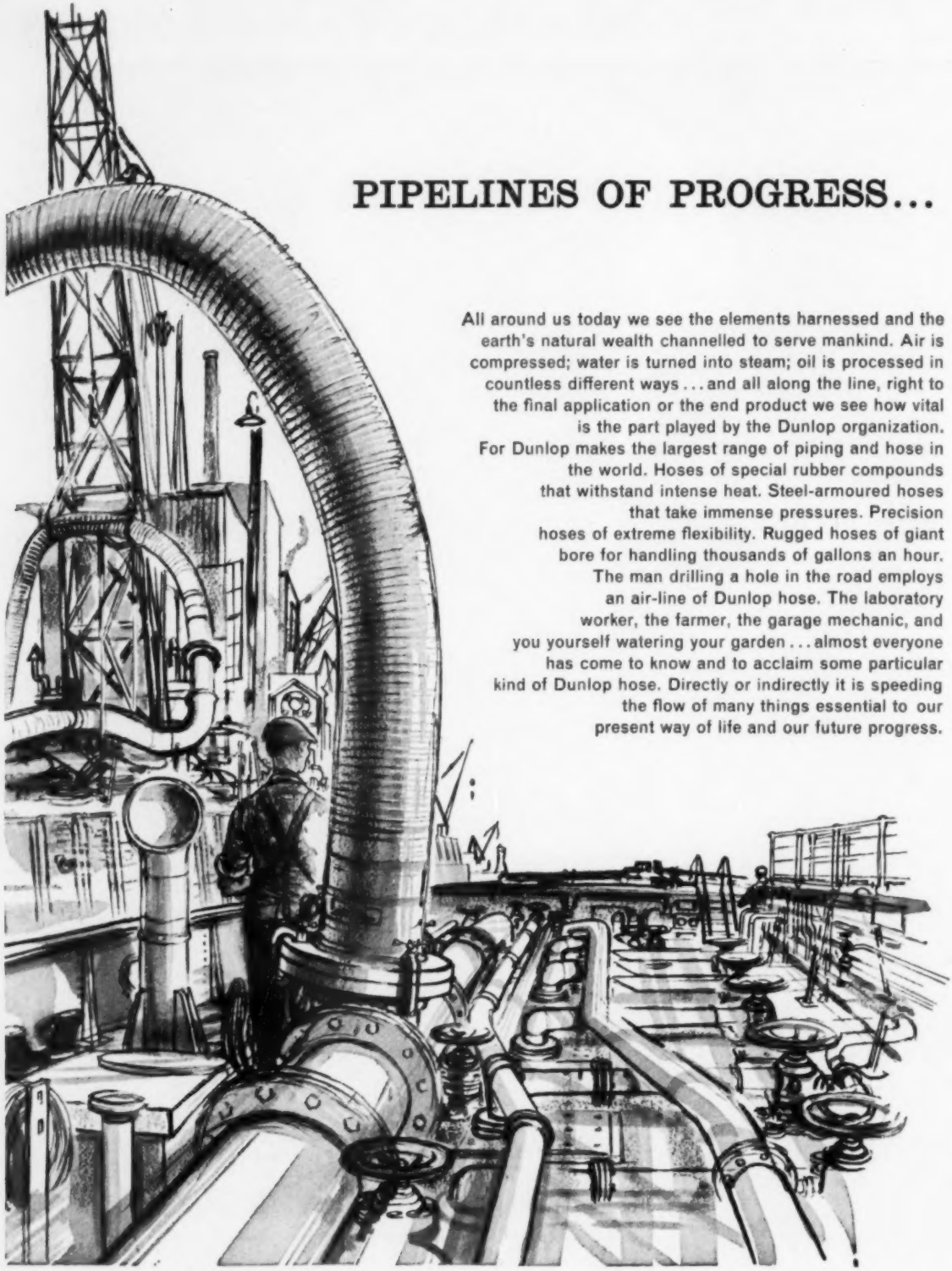

PIPELINES OF PROGRESS...

All around us today we see the elements harnessed and the earth's natural wealth channelled to serve mankind. Air is compressed; water is turned into steam; oil is processed in countless different ways . . . and all along the line, right to the final application or the end product we see how vital is the part played by the Dunlop organization. For Dunlop makes the largest range of piping and hose in the world. Hoses of special rubber compounds that withstand intense heat. Steel-armoured hoses that take immense pressures. Precision hoses of extreme flexibility. Rugged hoses of giant bore for handling thousands of gallons an hour. The man drilling a hole in the road employs an air-line of Dunlop hose. The laboratory worker, the farmer, the garage mechanic, and you yourself watering your garden . . . almost everyone has come to know and to acclaim some particular kind of Dunlop hose. Directly or indirectly it is speeding the flow of many things essential to our present way of life and our future progress.

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CPK/PR6/

J. W. Roberts Gets Big Contract

HIGH PRODUCTION RATE FOR GRP MOULDING

WHAT is thought to be one of the biggest contracts ever placed in the UK for a glass reinforced plastics moulding has been given to J. W. Roberts Ltd. It is for the production of water containers for the AEI—Hotpoint Supermatic washing machine. This incorporates a spin dryer and marketing started in Scotland yesterday.

The contract was awarded on a cost basis, due regard being paid to the special advantages of GRP over metal—in this application drumming is reduced and noise transmission cut down. Difficult points that have been overcome in producing a moulding to this design are: a draw of over 21in., with an allowance of only 1°21′ on the vertical sides; two localized areas for the fitting of bushes — these areas are without a draw allowance; and a deep and large diameter depression in the bottom of the container which is offset. Dimensions are 14⅛in. x 11⅞in. x 21¼in. deep. Wall thickness is .080in.-.090in.

The container is being produced from matched metal moulds at a very high production rate. The preform is built up on a 4ft. diameter open type machine, which can produce preforms up to 12 sq. ft. in projected area. A binder is applied and the preform baked at about 400°F. An advanced type of press is used, incorporating a moving platen which travels outwards to allow deep drawn products to be removed from the mould and withdrawn more easily. Press cure time is 2¾min.

The company has designed its own multi-drilling unit for use on this and similar jobs. It is fully automatic and drills 30 holes, varying in size from ⅛in. to 1½in. in diameter, on five sides of the container. This is said to be the most advanced form of multi-drilling equipment in Europe used in the mass production of reinforced plastics products. Final stages in the production include the fitting of a polythene spout, aluminium feet, and two small bushes in Ferobestos.

Asbestos Pioneer

Ferobestos — an asbestos-based phenolic material—is another product of this company which was established in 1870. The company was a pioneer in the commercial use of asbestos, an early development being the production of blue asbestos textiles for transport insulation.

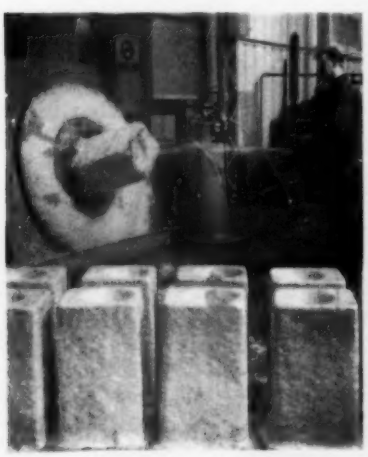
In 1931 J. W. Roberts took another step forward with the introduction of Limpet — an insulation coating of sprayed asbestos fibre. The process consists essentially of spraying prepared asbestos fibres and an inorganic binder together with jets of atomized water on to the surface. It has been used to thermally insulate many of the largest steam turbines in Europe, and in such diverse applications as the fire protection of all the cellular steel flooring in the 60 storey Chase Manhattan Building, New York, and the acoustical correction of the Brunei Mosque in North Borneo.

The company is now in a new stage of growth. In 1955, when it took over the Ferobestos range of products and entered the reinforced plastics field, it took over a new factory area at Hindley Green. This is five miles from Horwich, near Bolton, where a modern office and research block was established in 1958.

Unlike many firms, J. W. Roberts is not short of breathing space. There is plenty of room for expansion at Hindley Green—and it looks as though there will be plenty of need for it. The company is after a few more contracts on the Feroglas side like the Hotpoint job. And, in fact, there are several irons in the fire at the moment—GRP irons, of course.

Canadian President

C. E. Joslin, vice-president and general manager of the American Biltrite Rubber Co. (Canada) Ltd., Sherbrooke, was elected president of the Rubber Association of Canada, national trade association of the rubber industry in Canada, at the annual meeting held in Toronto.



The operator builds up the preform (*left*) **on a 4-ft. diameter open-type preforming machine.** (*centre*) **A predetermined quantity of resin is introduced after the preform has been placed on the mould.** (*right*) **Final inspection—giving some indication of the complex drilling procedure used and the high finish of the product**

Dunlop High Speed Tyre Testing

PREPARING FOR 1960 WORLD LAND SPEED RECORD

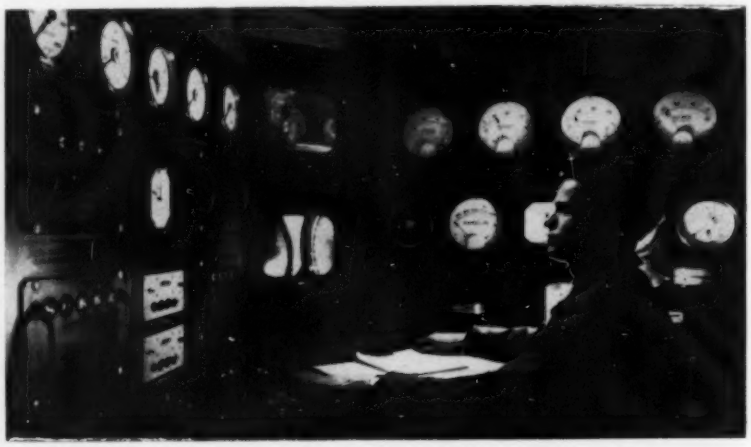
ALL successful attempts to break the World's Land Speed Record since 1929 have been made with the aid of Dunlop tyres, and tyres have been designed and manufactured for speeds up to 500mph which will be used in the attempt to be made this year by Donald Campbell. The record stands at present at 394mph and Mr Campbell has stated that his present aim is 400 plus, but that like his father the late Sir Malcolm Campbell, he is never satisfied.

The designing of tyres for very high speeds presents special problems. Firstly, centrifugal effects, which can cause disintegration, are proportional to the square of the speed. An increase of speed from 400mph to 500mph therefore represents a twofold increase in these forces. Secondly, the materials used must be of high strength, very high tensile steel for the tyre beads and high strength/low stretch rayon for the casing fabric. Thirdly, the rubber compounds used must be specially designed for low heat generation, and fourthly, the casing must recover rapidly from deflection, or a standing wave or 'ripple' will appear where the tyre leaves the track, causing severe internal stresses and high temperatures. Serious problems also arise in the testing of tyres at these very high speeds and the Dunlop Rubber Co. Ltd. has recently completed a new £75,000 plant designed for testing at speeds of 500mph and more.

Since September 1959 this plant has been fully engaged in confirming by continuous testing the chosen design for the 1960 Land Speed Record attempt. Although specially designed for operation at speeds of the order of 500mph the plant can be used with equal facility at lower speeds in the 60-200mph range, and so will be a valuable tool for proving racing and sprint tyre designs over a wide field.

Test Machine

The machine consists essentially of a vertical drum against which the tyre/wheel assembly is pressed horizontally by a hydraulic ram. The load on the tyre can be up to 1¼ tons and the machine will take tyres as large as 12in. wide and 54in. diameter. Under these conditions tests can be made up to 550mph, but if it is desired to spin test tyres for resistance to centrifugal forces only, without loading against the drum, speeds up to 675mph can be employed.



The operator makes a final check on circumferential speed, using the electronic controls on the left-hand panel, before bringing the tyre into contact with the driving drum. Tyre position can be seen on one of the television screens in the centre

Taking direct readings on a load gauge in the machine chamber, during calibration of the remote loading equipment

Because of the enormous energies contained in the machine chamber, this is placed underground in the interests of safety, should an emergency develop at high speed. The control room is above and to one side of this and is connected with the machine chamber by closed-circuit television, making it possible to watch the tyre safely at the highest speeds. Calibration grids can be superimposed on the television image enabling tyre dimensions to be measured accurately at any time during a test run.

The drum is driven by a 450hp electric motor, the tyre/wheel assembly having its own 250hp motor, and both assemblies include special arrangements for measuring power losses, rotational speeds, braking forces and air drag. There is more than one braking system on both drum and tyre, dynamic braking through the motors, and disc brakes which can be operated alone or in conjunction with the dynamic system.

Continued on page 817

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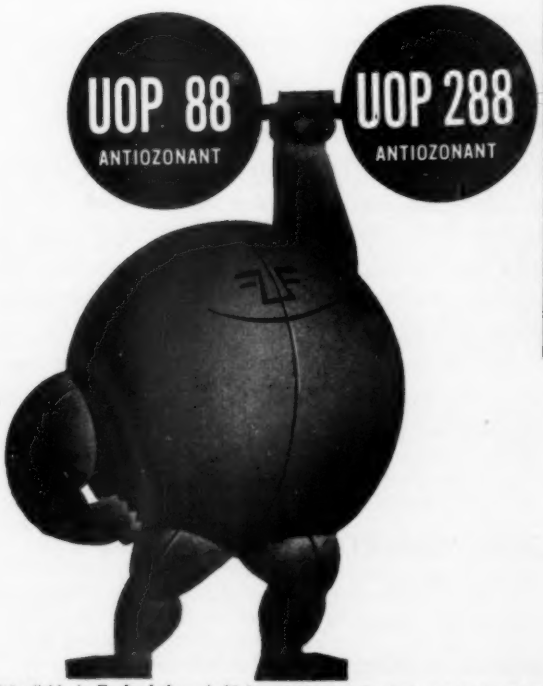
Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide. No cracks in 239 hr.



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Dr Philip Schidrowitz

SOME APPRECIATIONS

From Mr Sydney D. Sutton:

Writing as one who knew Dr Schidrowitz for 40 years, it is with a very sad heart that I mourn his passing. His modest demeanour, his ever kindly and often whimsical manner will ever be remembered by many in our industry, whose early days were guided by his knowledge and his ready willingness to give advice and help.

Many tributes have been written of his great work in the rubber industry but memory will take many back to months or years spent in the laboratory in Chancery Lane, where the training and guidance given by him started us on the paths that led to our careers.

The written work he left behind will enable those still young in the industry to absorb the pioneer work which has led to much of our modern knowledge.

I remember the advice he gave me when I was young in the industry which still holds good today—'You cannot hope to remember everything, but never forget where to find it.' Many such helpful hints have left their impression on chemists and technologists, now scattered in many parts of the world, who know that their lives have been enriched by their contact with the 'Doctor.'

Mr R. W. Lunn writes:

As a young man I had my private range of heroes—mostly scientists and mathematicians. Amongst them, of the rubber group, were de Vries who worked mainly on plantation subjects and Philip Schidrowitz whom I looked upon as a general scientist of no mean order. Those were the days when plantation rubber began to replace the wild rubbers. Schidrowitz wrote on the structure of crude rubber in 1909. He wrote on the future of the rubber industry in 1913. In 1922 he wrote on the history of vulcanization and between about 1920 and 1927 he published many studies on the stress-strain curve. To me this was fascinating work. I must have met him first during this period and there were many later occasions when I met him again.

He was an attractive man, utterly competent, with a bright active mind and a tremendous capacity for work. I believe I am right in saying that in the *IRJ* his 'Views and Reviews' were first published in 1920 and I doubt whether any issue ever failed to carry that feature.

He was a pioneer scientist in the industry at a time when the manufacture of rubber goods—technology—was well ahead of science. He did a wonderful amount of work when science was groping for a foothold and he certainly played a big part in putting in some of the scientific foundations of the industry. He was a man of many and great virtues and withal he was a modest man.

Dr S. S. Pickles writes:

I have known Dr Schidrowitz for over 50 years and during this period have frequently had the privilege of coming in touch with him on numerous occasions in connexion with rubber matters in which we were both interested, and in which he was so widely known as an undoubted authority and specialist.

It is now 50 years since he wrote his well known book '*Rubber*' and over the past 40 years he continuously contributed his widely read page in the '*India Rubber Journal*.' He had an intimate knowledge of the subject and was always keenly interested in the educational aspects as a lecturer from the early days when he lectured on rubber at the Finsbury Technical College (1910). He was also a practical investigator of rubber problems and in addition to his practice as an acknowledged consultant, he was personally responsible for important discoveries and patented processes with which his name was inseparably associated. He was a member of many scientific societies where he was always regarded as a valued adviser. The rubber industry was very indebted to him for many reasons and his name and reputation will long be remembered and honoured both at home and in the international field.

He was a delightful personality with a kind and humorous disposition whom it was a pleasure to know and to count as a friend.

Mr Frederick T. Brandon (former editor of this journal) writes:

The pleasure derived from my working life in journalism arose in no small degree from happy associations with colleagues and contributors. During the 15 years of my editorship of *Rubber Journal* (formerly *The India-Rubber Journal* and now *Rubber Journal and International Plastics*)—from 1942 until my retirement in 1957—the contributors' scene was dominated by the delightful personality of Dr Schidrowitz, a remarkable man whose devotion to his chosen profession was all but an obsession. He was far-seeing, precise, somewhat exacting; not merely was he an analyst by qualification but he was endowed with an analytical mind which enabled him to sift the wheat from the chaff with speed and confidence when surveying the literature appertaining to the world of rubber and associated materials. In this respect his scholarly knowledge of French and German was of immense help. He had a ready smile, which told of a kindly nature; and a wonderful sense of humour. He wrote impartially; he had a highly developed sense of right and wrong. He had an almost uncannily good memory and, above all, was at all times the quintessence of politeness and courtesy.

Very early in our association he gave me to understand that if I thought he could help me at any time I was not to hesitate to ask; on the other hand, Dr Schidrowitz in search of information meant that our office resources and records would be called upon for quick action and at the same time, maybe, friends in the industry would be consulted by telephone or letter. Over the years from the start of 'Views and Reviews' well-nigh 40 years ago—a weekly feature for the whole of that long period—Dr Schidrowitz had engaged in a most extensive correspondence with friends (rubber scientists, technologists and commercial men) the world over in search of information and I know better than anyone that many an item that he discussed in this feature was born of extensive correspondence and enquiries begun weeks or months earlier. He had little regard for the day of the week or the hour of the day if work called him, as it usually did, and if he were at work it seemed reasonable to him that the rest of us should be similarly inclined. Telephone calls from Dr Schidrowitz to my home on Saturdays and Sundays at any time after about 8 a.m. to discuss details concerned with articles in preparation or contemplation were commonplace and I recall that on one occasion he telephoned on the afternoon of Boxing Day concerning an addition he wished to have incorporated

in the following week's contribution. He had, he said, had a very busy day and he hoped I was not wasting my time celebrating too much!

My first meeting with Dr Schidrowitz was in the years immediately after the 1914-18 war. Occasionally at that time he walked the short distance from his laboratories in Chancery Lane to consult with Walter de Bois Maclaren, the then editor of *The India-Rubber Journal*, when the offices of Maclaren and Sons Ltd. were in Shoe Lane, in the City of London. One day, as I stepped out of my room (adjacent to that of Walter Maclaren) I all but bumped into Dr Schidrowitz, who was passing along the corridor. He paused and remarked: 'I don't think I know you' and asked me who I was. That was typical of the man; he just wanted to know. It was his quest for knowledge that lead to his achievements in rubber research. I remember him well as he was then: a dark-haired, distinguished, upright, dapper little man, with a ready smile and light of tread, dressed in a dark, plain-blue suit. With the passing of years his hair had turned white and, naturally, he was less spritely, but he retained, with all the sincerity that it conveyed, the ready smile, the wit and the kindliness of nature which had endeared him to the vast circle of friends who were rightly impressed by his erudition and his willingness to share his knowledge for the benefit of the rubber industry. His contribution to the scientific and technological sides of the industry was enormous and the death of this dear man, to whom I was for so long very much attached, marks the end of an era which has been followed by another of younger men of outstanding ability and many of whom would not wish to disguise the help and inspiration they received from Dr Schidrowitz.

Dr F. H. Cotton writes:

To those concerned with rubber education Dr Philip Schidrowitz was a legendary figure, whose 'Views and Reviews' have been the Readers Digest of the industry since time almost immemorial. In 1912 Dr Schidrowitz was one of a strong and representative committee (comprising such men as P. J. Burgess, Leslie Radcliffe and Herbert Wright) appointed, under the chairmanship of Noel Trotter, to advise the Governors of the Northern Polytechnic, London, on the future development of a day school and evening classes in rubber started the previous session by F. Kaye. This extract from the advanced course syllabus in the Polytechnic prospectus for 1912-13 would not be out of place today: 'Artificial rubbers and plastics substances—Reformed rubber and ebonite. The chemistry of rubber. Theories as to chemical structure. Synthetic rubber. Patents relating to rubber production and manufacture.' These courses continued with varying success until session 1916-17.

In 1920 Dr Schidrowitz was appointed part-time director and lecturer in rubber technology at the Northern Polytechnic to assist Dr T. J. Drakeley, the new head of the Chemical Department (later principal of the Polytechnic and now director of the National College of Rubber Technology) in re-starting the rubber courses. Throughout his long life Philip Schidrowitz remained keenly interested in the work of the Northern Polytechnic, and, after its establishment in 1948-49, of the National College.

Many are the happy and amusing tales recounted by some of the eminent men who started their careers in Schidrowitz's laboratories, or attended his lectures at the Polytechnic. He is remembered for his ability to write on the blackboard behind his back whilst talking! Amongst those doubtless proud to count themselves early disciples of this remarkable man are: S. D. Sutton, treasurer of the IRI; M. W. Philpott, now with the BRPRA; C. H. Birkitt, of Hubron Chemicals Ltd., who was a lecturer in rubber technology at the Northern Polytechnic before 1928; J. W. Malden, with INSA, of Santiago, Chile; and Dr C. A. Redfarn, who was associated with Dr Schidrowitz in 1923 on research for the RGA in connexion with rubber derivatives.

My earliest recollection of Dr Schidrowitz is a dapper little man, reputed to be an expert on whisky, who appeared at intervals in the laboratories of the 'Northern' whilst I was labouring through an evening B.Sc. course in the early '20's. It was rumoured that he was experimenting with rubber; but it was not until 1928, after I had been in the rubber industry five years and secured a position as lecturer in rubber technology, that I became acquainted with the doctor. It is doubtful whether he ever realized the extent to which he influenced my career.

In 1929 the new young rubber lecturer at the Polytechnic, keenly conscious of the limits of his experience, decided to spend his summer holiday in the USA and Canada studying rubber manufacture; but he knew no-one in America. He sought out Dr Schidrowitz and asked his advice. The response was typical: Cotton was armed with 11 letters of introduction to personalities in the industry on the far side of the Atlantic. To present these passports was a revelation. Wherever I went I was hailed as the friend of a man of great repute obviously held in the highest esteem. Not only was I privileged to see much that would not have been disclosed to a casual visitor; I made lasting friendships.

Early in the life of the National College of Rubber Technology Dr Schidrowitz scandalized some of the Board of Governors by suggesting it should be re-named 'The College of Polymer Technology.' Would the reaction be equally adverse today? Is it not possible that Schidrowitz was a prophet as well as a wise man?

Mr C. H. Birkitt writes:

My association with Dr Schidrowitz dates back to about 1920 when I vividly recall being interviewed by him in his own laboratory, which I was afterwards to know so well, for a rubber research scholarship at the Northern Polytechnic. This little man, little only in stature, was great in every other aspect. He was full of a quiet humour which soon put me at ease.

As time passed he was respectively my tutor and employer and always a very good friend whose assistance and advice were readily available, and I for one acknowledge my great indebtedness to him for the start of my 'rubber' career and for the benefit of his counsel over the years.

I still recall with the greatest of pleasure those years that Mr S. D. Sutton and myself spent in the little laboratory in Chancery Lane working under his direction—Mr Sutton on prevulcanized latex and myself on his new accelerator 'Superac,' the first of the super-accelerators.

The passing of this Grand Old Man will leave a gap in the rubber industry which it will be very difficult to fill.

United States Subjects

To the Editor

Sir,—I very much appreciate my father's obituary which appeared in this week's RUBBER JOURNAL. There is, however, one slight error. My father's parents were already subjects of the US when he was born. I think it is only fair to mention this and would be grateful if you will point this out.

Yours faithfully,

P. F. SCHIDROWITZ,
Managing Director.

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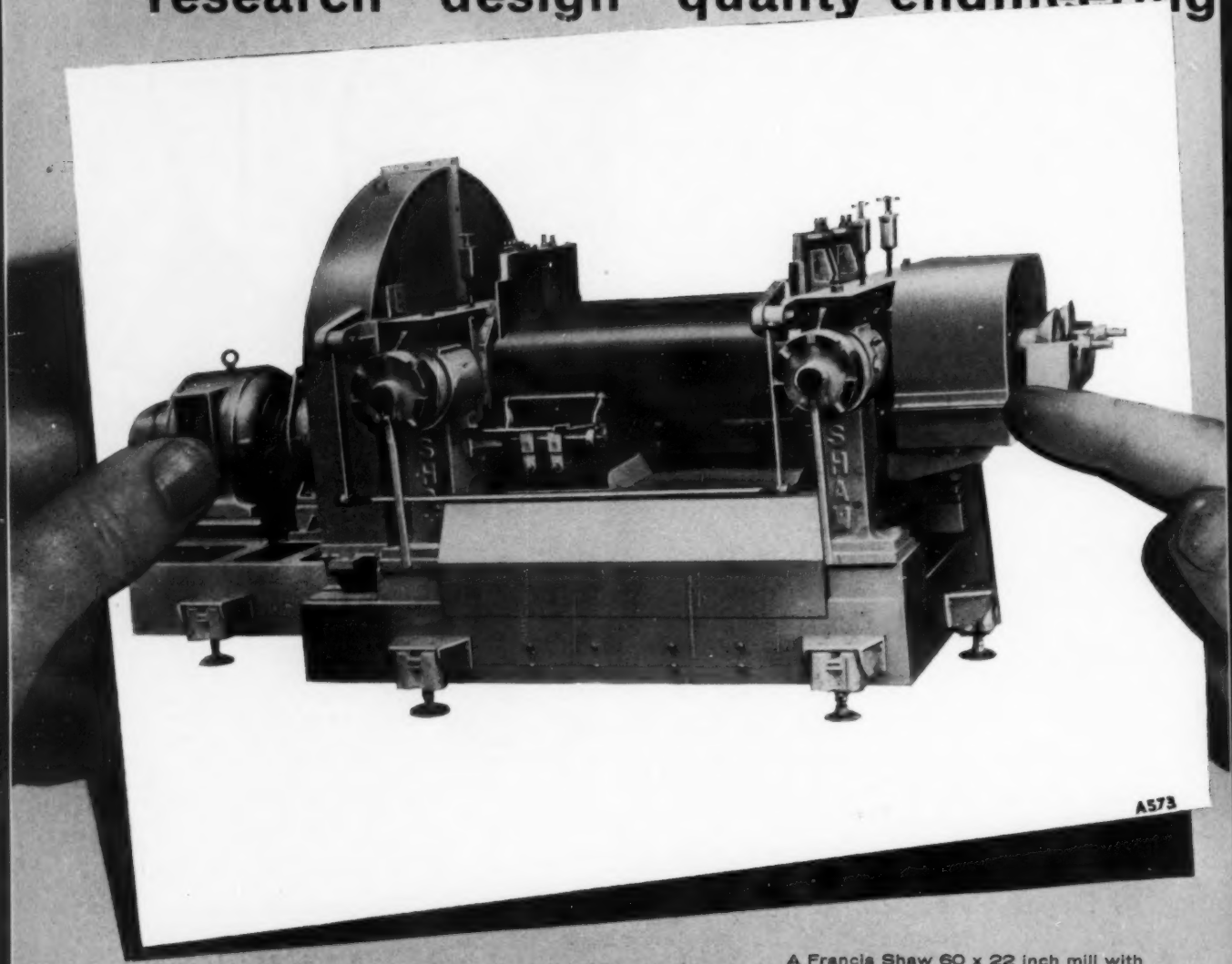

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OVERSEAS AGENTS THROUGHOUT THE WORLD P4351

MEN and MATTERS

A Review of People and Events

by George A. Greenwood

NYLON must be one of the most versatile of all materials. I daresay I could easily fill this page with a list of all its applications. There are nylon ropes and fishing nets, liquid containers and parachutes; nylon safety belts, sails, sutures, sacks and seedcrushing cloths. Tyres, of course, use nylon cord, and an increasing number of conveyor belt manufacturers are using ducks incorporating nylon.

So it was easy to see why the first fully comprehensive review of nylon's industrial uses ever staged in Britain, which was held this week at Park Lane House, London, was such an impressive display.

The first British Nylon Industrial Convention was held with the exhibition, and a most interesting series of papers, presented by experts from British Nylon Spinners, included a review of the rapid progress made by nylon in the 10 years since the first special industrial yarns were produced, a description of the technical development work carried out by BNS, details about research into proofed nylon fabrics, a description of experimental work with heat-stretching processes and a discussion about the implications of the European Free Trade Area.

Perpetual Envelope

Incidentally, one of the smaller uses of nylon that I haven't come across before is the Envopak. This is an envelope that can never come to grief—not even at the hands of the most merciless post office official. Made from proofed nylon fabric, it is fitted with a zip fastener and patent seal, and carries two windows. One, which can be reached only from the inside, carries a reversible addressed card; the other carries a card bearing franking labels or stamps.

Quite a number of insurance companies and other big commercial concerns are using the Envopak, mainly for correspondence between branches.

Elegance Concrete

The nylon exhibition came close on the heels of a sensational exhibition that was also held at Park Lane House: the exhibition of French Elegance. Both exhibitions were done by the same company—City Display—and the same person — Miss Frechon. The French exhibition made brilliant use of a number of Perspex pyramids, which were suspended in a darkened room, in which display models wore the latest fashions from Paris. And all the time musique concrete—electronic music—bubbled eerily through the room.

An upper room displayed bolts of fabric in a room that was hung with hand-blown 'tears of glass.' The only criticism I heard was that one tended to remember the setting rather than the exhibits. But that is better than a good many exhibitions where one remembers nothing except, perhaps, tired feet.

Over half the 30 boys who signed Ekco apprenticeship agreement forms this month are sons of Ekco employees. R. S. Barker (chief draughtsman, Ekco Plastics) and Mrs Barker watch their son sign his form before the company's education officer, A. R. Essex

Triskedekaphobia

I see that, after all, Friday 13 had the last word. When I wrote about the annual dinner dance of the Hytex Co. I noted that all the guests present became automatically members of the Triskedekaphobia Society; that fancy word meaning fear of the number 13 and of Friday 13 in particular (the day on which the party was held). I should have said, of course, the anti-Triskedekaphobia Society. The prefix became lost somewhere along the line.

The Business of Business

Most businessmen would like to double their firm's productivity—and there are usually plenty of suggestions about how to do it from people who know nothing about the business. But there is an organization whose business is businesses whose work is not so well known as it ought to be. This is the National Union of Manufacturers Advisory Service Ltd.—NUMAS.

This is a non-profit making management consultancy and advisory service catering for the special needs of the smaller manufacturer. One of their recent case studies deals with a plastics firm of 250 employees. The assignment covered the application of work study, followed by the installation of a system of standard costing to one department accounting for about 30% of total turnover. Capacity output, NUMAS says, was effectively doubled and the management provided with valuable control information about product profitability. The company is now in a position to continue the application of work study to other departments through its own staff—and good successes are already being scored.

Does NUMAS apply its own methods to NUMAS? Presumably so—since at this month's annual general meeting it reported that its industrial advisory service had doubled itself in two years.

Going to Greenland

Among the group of young men presented with a gold award by the Duke of Edinburgh at Buckingham Palace last week was Mr Kenneth Brown, an engineer/draughtsman apprentice at the Tyseley factory of Bakelite Ltd. He was accompanied

at the ceremony by his parents and Mr A. Lloyd, a director of Bakelite.

Kenneth, who lives at Small Heath, Birmingham, has also been chosen as one of a group of boys who will be taking part in an expedition to the mountainous region of the Staunings Alps in North-East Greenland in July this year. The expedition, which is being led by Sir John Hunt, consists of 12 experienced mountaineers and scientists, plus 21 boys together with their three leaders.

The programme consists of a number of exploration and scientific projects geared to the standard of the senior members of the expedition rather than that of the boys, who will thus have the satisfaction of taking an active supporting role in a major expedition programme.

A Goodyear Honour

From my friends of the Goodyear Co. who never forget me when interesting news is going around, there comes a notice concerning Mr H. L. Hyde, the vice-president of the Goodyear Tyre and Rubber Co., of Akron, Ohio. He has been awarded one of the highest decorations which are conferred upon foreign dignitaries by the Grand Duchy of Luxembourg, The Order of Adolphe of Nassau. The medal, House order of the Royal Family of Nassau, was presented to Mr Hyde, who by the way is also general counsel of the Goodyear Co., of Akron, by the Luxembourg Ambassador, Georges Heisbourg, on behalf of the Grand Duchess Charlotte. This, one of the oldest orders in Europe, has been given to Mr Hyde, according to the official citation, for his significant contribution in the organization and establishment of Goodyear's Luxembourg plant in 1951.

He is, I should add, the fifth member of the Goodyear organization which is so closely linked with Luxembourg, to be singularly honoured with the order by the Grand Duchy. Mr F. T. Magennis, president of Goodyear International Corporation, was a recipient in 1957. The late Mr P. W. Litchfield, former board chairman, Mr P. E. H. Leroy, vice-chairman, and Mr H. C. Pownall, managing director of Goodyear-Luxembourg, were previously honoured.

Mr Hyde, also well known in this country, joined the Goodyear organization in 1940 as general counsel and assistant secretary, and has served as a member of the company's board of directors since that time. He became a vice-president this year.

BTR Managing Director Dr W. D. Scott chats to James G. Nelson after the awards ceremony at Silvertown recently (*RJIP*, May 14, 742). Mr Nelson is the 5th member of his family to complete 50 years with the company

BTR Buyer

BTR Industries Ltd. announces the appointment of Mr F. S. Lloyd as purchasing officer for the group. For the last five years purchasing officer for the Crompton Parkinson group, Mr Lloyd previously held senior buying appointments with Mullard Equipment Ltd. and Marconi Instruments Ltd.

He has for many years been active in the Purchasing Officers Association, taking a leading part in its work in connection with education for supply management in industry.

He will operate from the BTR group headquarters at Herga House, Vincent Square, S.W.1.

Dunlop Director

R. C. ('Bob') Hiam has been appointed Sales Director of Dunlop's tyre replacement sales. Mr Hiam, who is president of the Tyre Manufacturers' Conference, has been with Dunlop for 30 years.

After working on the London Stock Exchange, he became a Dunlop trainee in 1930. He became district manager at Bristol three years before the outbreak of World War II, when he joined the RAOC and after service overseas was awarded O.B.E. Previous to this appointment he was general sales manager of the tyre division.

Question Corner—119

(Second Series)

444. Of what importance is shrinkage and warpage in the manufacture of polythene articles?

(Answer next week)

Answer to Question Corner—118

443. The following are some of the difficulties that arise in the application, by spraying, of synthetic stoving finishes.

Wrinkling—this is due to the outside layers of a finish hardening before the inner layers; the hardened surface is unable to contract in order to accommodate the shrinkage of the inner layers. It may be caused by the use of excess driers or foul atmosphere in the oven.

Orange Peel—this is usually a spraying defect and associated with incorrect solvent balance.

Cissing — is usually caused by a dirty surface, or the presence of oil or water in the compressed air. Some synthetic compositions, such as phenolics, have a tendency towards cissing but this can usually be overcome by the addition of an alcoholic solvent such as butanol, which incidentally will tolerate a little water.

Cissing may also occur on cars which have been polished with silicone-containing polishes. Rubbing down to the base metal is the only remedy.

Popping—is a characteristic trouble which arises from an incorrect solvent balance which allows the film to skin over before sufficient solvent has been removed to allow small amounts remaining to diffuse out of the film without rupturing it. As the residue comes out they burst the surface skin leaving small holes. Thick films tend to 'pop' more than thin films.

(Another question next week)

Polly Ester Says . . .

'Co-polymer — variations on a polytheme'

A CROWNING ACHIEVEMENT

CABOT'S exclusive new process—patents applied for—provides a new family of oil furnace carbon blacks with unique properties.

REGAL 300

A NEW low modulus oil furnace black giving rubber properties similar to premium-priced channel black, but with a faster curing rate approaching that of an HAF black.
Its higher tensile strength and elongation, lower modulus and excellent reinforcement coupled with fast cure rate, offer a combination of properties not previously obtained by a single black type.

REGAL 600

A NEW low "structure" fine particle size oil furnace black with the excellent tread-wear resistance of an ISAF type, and giving promise of enhanced cutting and chipping resistance. Regal 600 provides higher tensile strength and elongation than ISAF black together with lower modulus and hardness.

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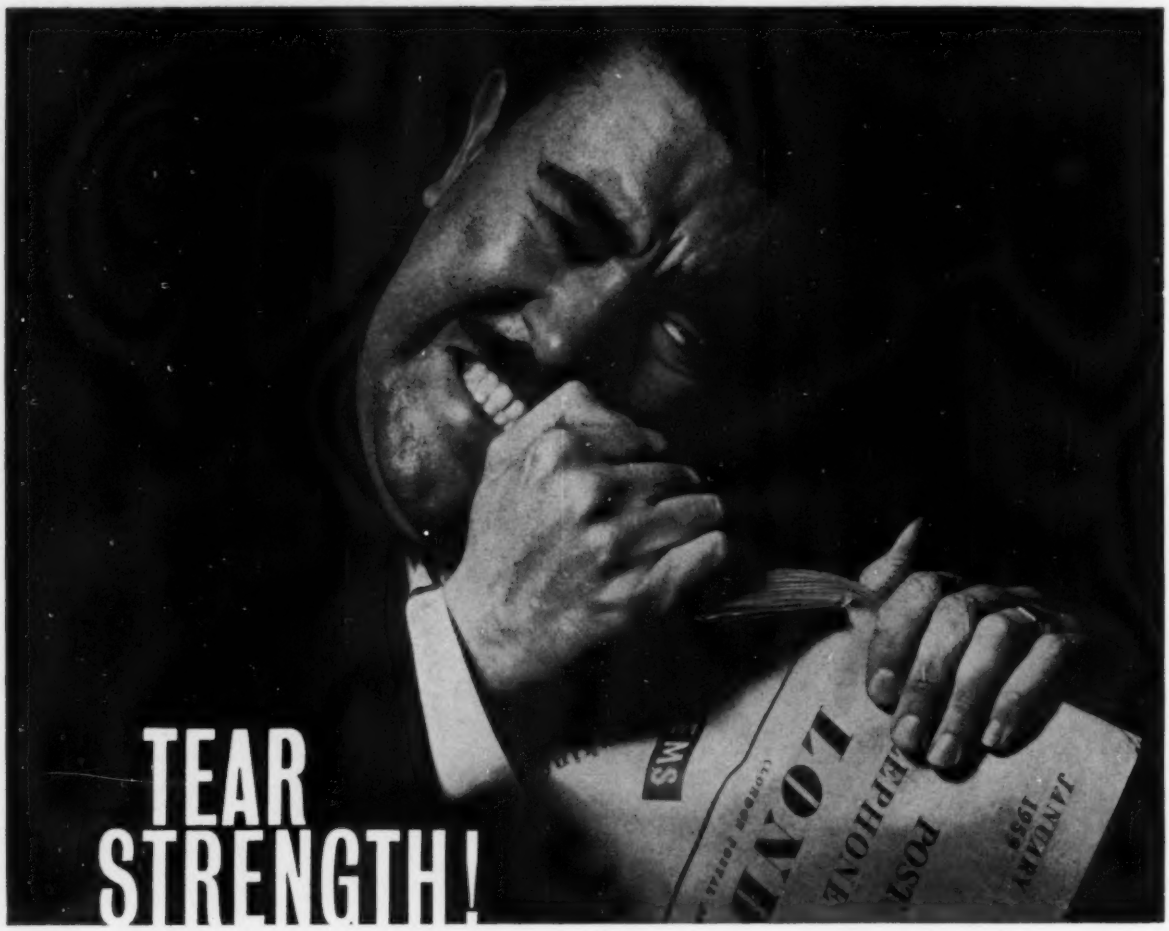

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For instance, tests incorporating Alusil or Microcal in resin rubber compounds have recorded tear strength values *exceeding* 600 p.s.i. at 80 to 90 loading.

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Tell you what. Drop a line to the address below and we'll be pleased to send you full details of these remarkable white fillers. That way, you'll be able to judge for yourself.

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*REGISTERED TRADE MARKS

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CML 35-7256-120

New Plant for Bristol Epoxy Pipe

BIG RESPONSE TO PIPES AND PIPELINES EXHIBITION

BRISTOL Aeroplane Plastics Ltd. is going into large scale production on a complete pressure piping system of reinforced epoxide resin. This is said to be highly resistant to corrosion by most dilute acids and alkalis, even up to temperatures of 120°C. Called Bristol Pipe, it will be on show for the first time at the International Pipes and Pipelines Exhibition, which opens at Earls Court on May 30.

Demand for space at this exhibition has been so great that the floor area has been increased to double that originally planned. Besides a large number of exhibitors who will be showing different types of pipe materials, many stands will show important ancilliary equipment such as insulation, protection, testing and welding equipment, as well as fabricated pipework, pumps, valves and fittings.

Bristol say that their pipe is produced in sizes ranging from 6in. to 15¼in. bore. Piping is supplied in standard 20ft. lengths, with a standard range of ancillary fittings—tees, bends and flanges. The pipes can be either flange-jointed or bonded: the bonded-joint method is favoured for permanent pipeline installations, and Bristol has developed special mobile equipment enabling pipes to be rapidly and efficiently bonded *in situ*. The pipe is soon to go into large-scale production in a new automatic pipe winding plant now being built at Bristol, following several years of research and development testing.

Through their exclusive licence agreement with Resistoflex Corp. (USA), BTR says that it is the only company in the UK to offer a complete range of PTFE-lined pipes and fittings, dip pipes, thermowells, spargers, bellows and chemical transfer hose. Among examples on display will be a 5ft. length of 6in. i.d. pipe and a 10ft. length of 2in. i.d. hose.

In co-operation with Gewerkschaft Keramchemie of Western Germany, for whom BTR acts as representative in the UK, a range of products manufactured from phenol formaldehyde resins will be exhibited, and in addition, there will be examples of rubber (natural and synthetic) and ebonite-lined pipes and components, and sprayed coatings of Neoprene, Hypalon and PVC. There will be a working circuit comprising a display to illustrate the use of PVC and polypropylene pipes and fittings, an ebonite-lined pump and glass-fibre tank.

Examples of a tee junction and a bend in the Bristol Pipe system

George Angus will show samples of over thirty types of rubber hose which they now market, most of which are of handbuilt wrapped ply construction. Apart from types for water, suction and delivery, and delivery of air, water, steam, petrol and oxy-acetylene use, there are special grades for dairy, brewery and agricultural applications. Display panels will illustrate the fact that Angus are the biggest manufacturers of fire hose in the world.

Since they introduced Vacuflex (plastic hose with a tempered steel spring moulded into the wall) Recon Pipelines have developed quickly. They will display hose of from 1—4in. bore. Twelve new machines are now being built, and are designed to produce hose of from 4—8in. bore. Pipes will be shown in pvc, nylon, Rigidex high density polythene, rigid pvc, polypropylene and other materials.

DRACONE PRICE DROP

Dracone Developments—the company in which P. B. Cow has an interest—yesterday announced a price reduction programme to stimulate sales of the sausage-shaped containers.

Admiral Sir John Eccles, chairman of the company, announced that 'in view of the large potential demand for the Dracone which has emerged since this company was formed in February, we have decided to reduce prices by up to 30% on bulk orders.' The reduction applies to orders for six or more Dracones. For example, the unit cost of a 100-ton Dracone is £7,710. Bulk order reduction price is £6,695.

At the same time as this announcement, one of these neoprene-proofed nylon containers was demonstrated for the first time in America. It carried 35 tons of oil across New York Harbour.

DSIR have published 'Instructions for using the portable skid-resistance tester.' The apparatus consists essentially of a pendulum which sweeps a rubber slider over the road surface and with its aid the frictional resistance between the slider and the surface can be determined.

Dunlop High Speed Tyre Testing

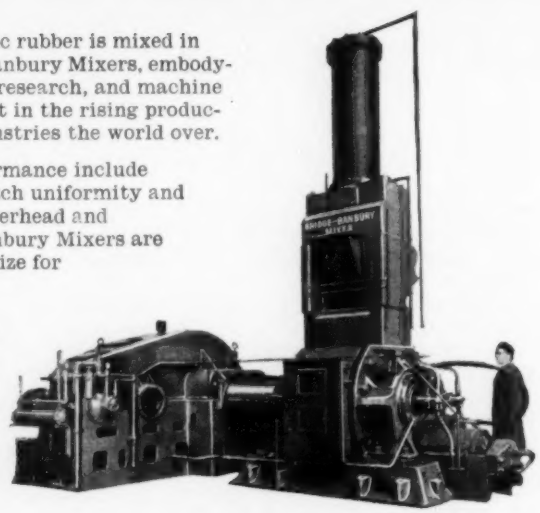
Continued from page 806

The whole machine can be brought to a standstill from 500mph in less than a minute if necessary. The tyre loading and carriage system which weighs 3 tons floats over its base plate on a cushion of air, thus greatly reducing the friction on the bearings and enabling the load on the tyre to be very accurately measured. Two television cameras, mounted on an optical bench, watch the tyre or any other part of the equipment desired. Both have two lenses, one for a general view and the other for close-up, and can be moved side-to-side or back-to-front in thousandths of an inch, their movements being recorded.

Broadly speaking, four types of tests are carried out — very high speed tests — normal high speed tests — controlled braking tests and spin-up 'free fling' tests, and these enable all the conditions likely to arise during the record attempt to be simulated.

No less than 85% of the world's natural and synthetic rubber is mixed in Banbury Mixers.* Small wonder then, that Bridge-Banbury Mixers, embodying more than a generation of practical experience, research, and machine design, continue to play an almost indispensible part in the rising productivity of the ever-expanding rubber and plastics industries the world over.

Indisputable claims for Bridge Banbury Mixer performance include optimum dispersion, speedier mixing, consistent batch uniformity and quality, increased production and a lower labour, overhead and maintenance cost per unit of production. Bridge Banbury Mixers are designed for round-the-clock operation. There is a size for every production requirement. Ancillary machinery matched to deal with the increased output and further streamline the production flow is available. **Bridge-Banbury Automation is continuous production.**



Fully detailed technical information is freely available on request.

* *Banbury is a registered trade mark in many countries throughout the world.*

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Institution of the Rubber Industry

REPORT ON THE 1959 EXAMINATIONS

(Concluded from May 14 issue, page 744)

LICENTIATESHIP

The Chairman commented as follows on the 1959 Licentiateship examination:

It was felt that the general standard of LIRI candidates was somewhat lower this year. Of the 40 candidates who failed, 12 did so in one paper (4 in Rubber Technology I, 3 in Rubber Technology II, and 5 in Rubber Technology III), 12 failed in two papers (4 in I and II, 6 in II and III, 2 in I and III), and 16 in all three papers. There was a higher proportion of really poor candidates than in recent years.

There appeared to be a lack of knowledge of fundamental principles. The comments of the examiners should be brought to the notice of future candidates so that they have some idea of what is, and what is not required of them. The International Diploma results were very gratifying.

RUBBER TECHNOLOGY I

Applied Science

Q. 1. *Write brief notes on the uses of* five *of the following in the rubber industry*: (*a*) *balata*, or *gutta-percha*, (*b*) *diethylammonium diethyldithiocarbamate* (*DDCN*) (*c*) *ammonium oleate*, (*d*) *benzoyl peroxide*, or *dicumyl peroxide*, (*e*) *nitrile rubbers*, (*f*) *cyclized natural rubber*, (*g*) *coumarone resins*, (*h*) *methyl ethyl ketone* (*MEK*).

(74 answers). Those who failed on this question did so usually through inadequacy of information rather than inaccuracy. A number of candidates wasted time in describing the preparation of nitrile rubbers when this was not asked for.

Q. 2. *Contrast briefly the effects of each of* four *of the following materials in natural rubber and in a general purpose neoprene rubber* (*e.g. Neoprene GN-A*): (*a*) *sulphur*, (*b*) *zinc oxide*, (*c*) *magnesium oxide* (*calcined magnesia*), (*d*) *litharge*, (*e*) *diorthotolyl guanidine*.

(61 answers). This was quite well done, although there was some muddle over litharge and DOTG.

Q. 3. *Describe the production of* two *of the following in a form suitable for use in rubber*: (*a*) *furnace black*, (*b*) *sulphur*, (*c*) *zinc oxide*.

(79 answers). Satisfactorily answered by most candidates. Some confused furnace with other types of black.

Q. 4. *Calculate the weight in lbs. of a sphere* 4 *inches in diameter of the following compound, neglecting any volume change during vulcanization.*

	Parts by weight	Sp.Gr.	Cost per lb. s.	d.
Rubber ..	100	0.93	2	0
Zinc oxide ..	5	5.56		10
China clay ..	40	2.65		1½
Whiting ..	60	2.62		1
Carbon black ..	5	1.80		10
Stearic acid ..	2	0.92	1	3
Mineral oil ..	2	0.84		6
Antioxidant ..	1	1.20	5	0
Accelerator ..	0.8	1.40	5	0
Sulphur ..	3	2.07		3

What will be the material cost of the sphere? One cubic foot of water weighs 62.5 *lbs.*

(74 answers). Many candidates approached the solution to this problem by very devious ways and consequently lost marks through errors. The usual group of 'impossible' answers appeared.

Q. 5. *Give a labelled diagram showing the essential features of an apparatus for carrying out the International* (*British*) *rubber hardness test. Describe the method of test using this apparatus. Why is it unreliable to convert hardness results from the scale of one test method to corresponding readings for another test method?*

(35 answers). The answers were generally good. Many drawings of a modern instrument showed external appearance instead of mechanism. 35 gm. was sometimes given as the minor load, and the indentor was occasionally called a needle or pointer. It was not always realized that the occurrence of different readings with different methods is not sufficient to make conversion unreliable.

Q. 6. *Outline the main features of load-deflection behaviour of soft vulcanized rubber in compression between parallel plates.*

How is a rubber engine-mounting made to be stiff in compression but more easily deflected in shear?

(9 answers). Presumably not much is taught on this subject. The few answers given were mostly poor. There was no mention of shape factor or its effects.

Q. 7. *Tabulate the differences in* (*a*) *curing characteristics, and* (*b*) *properties of vulcanizates, between* four *of the following in natural rubber stocks*: (*a*) *thiocarbanilide*, (*b*) *diphenylguanidine*, (*c*) *mercaptobenzthiazole*, (*d*) *dibenzthiazyl disulphide*, (*e*) *zinc diethyldithiocarbamate.*

Formulate a curing system for a sulphur cure of natural rubber without elemental sulphur as an ingredient. What are the advantages and uses of such a system?

(39 answers). This subject was generally well known and expressed.

Q. 8. *Describe* two *methods of measuring in the laboratory the scorch time of an unvulcanized compounded stock. For each of the methods indicate circumstances in which it would be preferred to the other method, and the reasons for the preference.*

(52 answers). Many answers were very good, although information on the last part was seldom presented in the form requested. Some of the graphs showed Williams or Rapid plasticity numbers decreasing in the initial stage of scorching. Several diagrams of the Mooney plastometer showed the end of the sliding shaft bearing on the clamped end of a studdy 'spring'.

D. A. W. IZOD.
G. N. WELDING.

RUBBER TECHNOLOGY II

Works Practice

In general the standard of the candidates seems to be considerably lower than last year. Quite a few did not answer all the questions and some answered only one and a half questions. There are still candidates who do not read the questions with sufficient care, and even when asked for diagrams, there was no attempt to give them. Some questions were not numbered, and some were wrongly numbered, which made it all the more difficult for the examiners.

The standard of English seems low and the ability to express ideas in a concise and intelligent form appears to be lacking among a large proportion of the candidates.

Q. 1. *Describe four methods which can be used for concentrating natural rubber latex, giving diagrams where appropriate. Give some indication of the concentration achieved by each method.*

Although this question was thought to be easy, it was not particularly well answered. One candidate said there were only three methods of concentrating natural rubber latex. Another obligingly indicated that all the information he had written down had been obtained from a latex handbook used in the trade.

Q. 2. *Describe the market grading and technical classification of raw natural rubber. Describe the tests for* (*a*) *impurities and for* (*b*) *suitability for any* two *products.*

This was an unpopular question and only 9 candidates secured more than half the possible marks. The subject is an important one and it is considered that all LIRI students ought to know more of the raw materials at their disposal.

One candidate described a process for making smoked sheet which was, in fact, that used for para biscuits.

Q.3. What methods are available for manufacturing cellular rubber? Describe one of these methods in detail.

This question was generally fairly well answered although some very peculiar answers were also found. In some cases no reference was made to latex foam, the most important group.

Q. 4. Sheeting off from a mill or calendering or extruding are methods used for shaping unvulcanized stock prior to vulcanization or to making up into an article. Discuss the relative merits of these shaping methods, and for each of these methods describe an application.

This was one of the popular questions—it is also considered an easy one for LIRI students. Even so, only a comparatively small proportion obtained more than half the possible marks.

Q. 5. Describe the manufacture of one of the following articles and outline the compound or compounds to be used: (a) a steam hose, (b) a wringer roller, (c) a bicycle tyre inner tube, (d) a moulded rubber sole, (e) an oil-resistant gasket.

This was a very popular question and on the whole well done.

Q. 6. Describe three methods of reinforcing hose with textiles, and compare the properties imparted to the finished hose by these methods.

A fairly popular question, but it would seem that a considerable number of students were uncertain when to use a vertical braider and when to use a horizontal one.

Q. 7. How would you establish the correct times for (a) mastication, (b) mixing of a new tyre tread compound in an internal mixing machine of modern design? A simple one-stage mixing procedure may be assumed.

Few candidates attempted this question and it was poorly answered. Very few candidates appear to know how to determine the mixing time of a compound.

Q. 8. Explain the working of an automatic temperature controller for a steam-heated multidaylight vulcanizing press.

If after a period of satisfactory working the temperature of one or more platens is found to have departed from the set temperature, what are the first steps to be taken in an attempt to locate the fault and correct the temperature for the time being?

An unpopular question but well answered by a large proportion of those attempting it.

A. COOPER.

J. W. DENSON.

RUBBER SCIENCE

The standard of the candidates' English was once again good, but their knowledge of chemistry was not as sound as last year. The basic chemical knowledge required to answer these questions was elementary, yet the candidates did not appear to have sufficient grasp of fundamental principles.

Chemistry

Q. 1. Describe the preparation of ethyl acetate from ethyl alcohol and acetic acid. Outline the preparation of two types of factice from naturally-occurring esters.

(47 answers). Candidates appeared to know more about the preparation of factice than about the preparation of a simple organic ester: the purification of the crude ester was either omitted or treated in a very cursory manner.

Q. 2. Explain how the two chief kinds of hardness in water are caused, and indicate in each case how such hard water may be softened.

What forms of calcium carbonate are used in rubber compounds? Outline briefly how they are prepared.

(62 answers). A popular question, but again insufficient attention was given to the first part. Candidates should have realized that 'outline briefly' implied that the marks gained for the second part of the question would not be high. Many gave the impression that the temporary hardness of water was not an industrial problem, since it could be removed by boiling.

Q.3. A solution of 0.5 g. of sulphur in 30 g. of carbon disulphide boils at 0.155° C. above the boiling-point of the pure solvent at the same pressure. What is the molecular formula of sulphur in this solvent? (K = 23.5° C. per mole per 100 g. carbon disulphide; S = 32.)

How has the molecular weight of raw natural rubber been determined?

(23 answers). This question was attempted by only 25% of the candidates, but the majority of these gained over half marks. Many relied on remembering the formula; the examiner would have preferred evidence that they were familiar with the fundamental thought behind that formula.

Knowledge of the determination of the molecular weight of rubber was very meagre; only two candidates gave good answers.

Q. 4. Describe in detail one method of determining the amount of 'extractable sulphur' in a sample of vulcanized natural rubber. What does the value obtained in this way represent? Of what practical use is the information?

(64 answers). The major part of this question could be answered from B.S. 903, but a number of people seemed puzzled by the term 'extractable sulphur'. This is illustrated by the high proportion of low marks: 25% of the candidates failed to gain more than 20% of the total marks. The last part of the question was answered in a very haphazard manner: evidently many of those who know how to determine extractable sulphur do not know the practical value of the information obtained!

Physics

Q. 5. State Ohm's Law. Describe the changes in the electrical conductivity of vulcanized rubber produced by: (a) acetylene black, (b) channel black, (c) reinforcing furnace black.

A battery of e.m.f. 3 volts and internal resistance 5 ohms drives a current through an external resistance of 25 ohms. What alteration must be made in the external resistance in order that the heating effect in it may be increased by 80%?

(51 answers). There were very few good answers and most candidates were unable to obtain correct solutions to the rider. Candidates appeared to recognize the basic principles governing the question but were unable to apply them fully because of lack of practice.

Q. 6. How would you determine the specific gravity of a mineral filler? Indicate clearly the precautions you would take to minimize errors.

A piece of vulcanized rubber weighs 2.375 g. in air and 0.515 g. when totally immersed in water at 10° C. Calculate the specific gravity of the rubber. Density of water at 20° C. = 0.998 g. c.c. Coefficient of cubical expansion of water is to be taken as 3.02×10^{-4} per deg. C.

(75 answers). A very popular question which was reasonably well done.

Q. 7. Define relative humidity. What are the conditions which determine the formation of (a) fog and (b) dew?

Calculate the quantity of heat required to superheat one kg. of aqueous vapour from 100° to 150° C. at constant pressure. The specific heat is 0.502. If the initial volume is 26.75 litres find the final volume assuming that the laws of a perfect gas are followed.

(60 answers). Another popular question but, surprisingly, few candidates knew the cause of fog. Good marks were obtained by a satisfactory proportion of the candidates.

Q. 8. What are the similarities between radiant heat and light? Explain the terms infra-red and ultra-violet radiations, and indicate an application of one type of radiation in the rubber industry.

The flat surface of a metal disc 1 mm. thick is exposed to a source of radiant heat placed 1 metre away so that the radiation falls normally on the surface. The temperature of the disc increases 35° C. in 5 minutes. Calculate the temperature increase of a similar disc 2 mm. thick placed 1.5 metres from the source of heat for 8 minutes. Assume there is no heat loss from the discs.

(28 answers). Of the small number of candidates attempting this question only one gave a satisfactory answer. There was widespread confusion between the terms temperature and heat and some candidates had only heard of radiation in conjunction with atomic energy.

S. H. MORRELL.

L. MULLINS

COMPANY MEETING

The Rubber Growers' Association

INDUSTRY'S PARTICULARLY GOOD YEAR IN 1959

Marked Upsurge in Demand Exceeded Record Production · Governments' Part in Safeguarding Industry's Future

T. H. MILLER ON NEED FOR GREATER SUPPLIES OF LOW-COST NATURAL RUBBER

THE annual general meeting of The Rubber Growers' Association (Incorporated) was held on May 20 in London, Mr T. H. Miller, the chairman, presided, and in the course of his speech said:

Although our membership shows a decrease as compared with last year, due to some extent to the efforts being made within the industry itself to bring some of the smaller companies into

T. H. MILLER
retiring chairman, who presided

larger groups, you will have been interested to see from Council's Report that our company membership still represents a total Issued Capital in the neighbourhood of £90m.

Issued Capital of course is not a true measure of the total investment by our members in the industry. Over the years there has been reinvestment on a substantial scale. In Malaya, for example, our members have for some years been reinvesting on average at an annual rate equivalent to between 15 and 20% of their Issued Capital. Such figures give some idea of the contribution which the members of this Association continue to make to the economic development and welfare of many peoples and nations.

Record Demand for Natural Products

Our industry had a particularly good year in 1959. The demand for our product was higher than ever before. Over 2,100,000 tons of natural rubber were consumed despite a significant increase in the relative use of synthetic rubber. The upsurge in demand for natural rubber was so marked—consumption in 1959 being about 7% above that in 1958—that a record production of some 2,075,000 tons was unable to satisfy the world's needs. As a result of this tight position, the average price for No. 1 Sheet in London in 1959 was over 30d. compared with 23¾d. in 1958.

We as natural rubber producers have been doing our part to increase the supplies of our product to help satisfy the world's present and future needs.

Our industry, however, cannot play its full part without the full support and co-operation of Governments and organized labour in the producing territories.

Malaya

In the Federation of Malaya where most of our members' interests lie, we have had this support and co-operation both from Government and labour. The leaders of the plantation workers' trade unions have shown commendable appreciation of our common needs and problems. The present agreement which was made between the Malayan Planting Industries Employers' Association and the National Union of Plantation Workers some 15 months ago, after patient and friendly negotiations, is an outstanding example of this. I think all of us with plantations in Malaya will agree that the agreement is working well and giving general satisfaction to both sides.

The Alliance Party, which was returned to power with a substantial majority in August last in the Federation's first fully elected Parliament, has clearly demonstrated its great interest in Malaya's premier industry. In its election manifesto the Party pledged itself to encourage the replanting of rubber, especially by smallholders, making use of high-yielding strains; to maintain the best standards in the quality of rubber exported; and, to review the entire organization of the various research bodies financed by the Malayan Rubber Fund so as to bring about greater co-ordination of their activities.

The great increase in the annual rate of replanting which has taken place since the Government's Replanting Scheme was introduced in 1955 is ample evidence of its success. The scheme covers a seven-year period so that it comes to an end in 1962. It has been so successful and of such benefit to Malaya that its extension after 1962 is fully expected.

The Government is clearly not unmindful of the fact that more and more natural rubber will be required in the future. The present Minister of Finance, Mr Tan Siew Sin, who has extensive knowledge of the rubber industry, was, I believe, the first person in the world in recent years to advocate wholesale new planting. He has done this consistently and only a short time ago he called for another 1,000,000 acres of rubber plantations in Malaya. Moreover, both Mr Tan and the Alliance Government have encouraged the investment of foreign capital in this and other projects. Some of our members are, however, experiencing problems regarding the alienation of land and its conditions of tenure and until these have been overcome large-scale new planting can scarcely take place.

Ending of Emergency

All those who love and serve Malaya heard with great relief and thankfulness a short time ago the announcement by the Malayan Government of the ending of the so-called Emergency. Commencing in 1948 this revolt against law and order brought death and injury to many planters and others and destruction to much property. It was pleasing to hear recently that the Prime Minister, Tunku Abdul Rahman, had referred with appreciation to the consistent co-operation over these difficult years between the smallholders and the workers and managements in the rubber industry, and the Government. I would like to add my tribute to the courage and endurance of all those who served the rubber plantation industry so loyally during this very anxious period.

A Government can play a great part in helping private industry to make its contribution to the happiness and welfare of a country's people and we acknowledge, with appreciation, what the Federation Government has achieved.

In Ceylon, where a number of our members have estates, the Government

has given great assistance to the industry by its replanting schemes. On the other hand, the industry has been disturbed in recent years by talk of the possible nationalization of plantations. Foreign plantation owners, however, gained some encouragement in 1959 when they were reassured by the late Mr Bandaranaike, who was then Prime Minister, that his Government did not intend to nationalize plantations for at least another 10 years. Mr Bandaranaike went on to say that nationalization of plantations was not a magic wand to cure the country's economic ills. His successor, Mr Dahanayake spoke even more strongly against such nationalization, and Mr Senanayake, the leader of the United National Party, has said that he and his party are completely opposed to it.

The Ceylon Government's first replanting scheme was introduced in 1953 for a five-year period. Its success was so pronounced that the Government extended the scheme for another five-year period by the end of which it is expected that roughly one-third of Ceylon's rubber acreage will be planted with modern high-yielding material.

As in the Federation of Malaya, therefore, so in Ceylon the Government is assisting its rubber industry in becoming more productive and efficient. In British Borneo also the Governments are co-operating with producers in replanting schemes. The Government of India is taking more and more interest in its natural rubber producing industry and is anxious to increase its productivity by modern methods.

Some of our members have already established plantations in Commonwealth West Africa and others are in the process of doing so. Expansion of plantations in the area has been made possible by the change in the regulations governing the alienation of land, now that most of the territories are independent or about to achieve independence. In some territories, however, there is still much that Governments could do, especially in the fields of taxation and marketing restrictions, to attract large-scale foreign investments in plantations.

Indonesia

The position in Idonesia is clouded by the difficult political and economic conditions which that country has endured during the past year. Nevertheless the plantation industry has continued to make its important contribution to the foreign exchange earnings of the country, a large part of which accrues from foreign-owned estates. Representatives of our member companies are working in close harmony with their Indonesian colleagues on the Government operated estates and jointly making strenuous efforts to develop further the natural rubber industry to the mutual benefit of the country and themselves.

Many of the difficult problems which have to be faced are common to both Indonesian and foreign companies, such as the import of essential supplies for estates, illegal occupation of land and lack of security in certain areas, which seriously affects the outturn of workers and, in some cases, even makes access to plantations virtually impossible. The blocking of funds which were earmarked for replanting expenditure has raised acute problems of finance.

Special problems affecting foreign companies are the delays and uncertainties regarding profit remittances, entry and work permits for expert staff and uncertainty regarding titles to the estates.

Land Tenure

The authorities in the East Coast of Sumatra ordered certain estates whose concessions had expired to be handed over to Indonesian concerns, despite earlier repeated assurances that new titles would be granted to the owners of all efficiently operated estates. Following representations at very high level, action has been suspended pending a review of the matter by the Foreign Investment Council. More recently there have been reports that all foreign rights to land concessions were to be abolished, and that in approved cases, new leases would be issued. It can only be hoped that Government will soon make clear its intentions in regard to land tenure.

Confronted with present difficulties and future uncertainty, it is indeed praiseworthy not only that production of our members' estates has been maintained, but that progress has been made with replanting programmes.

Unless the Indonesian Government is able to find solutions to the above problems at an early date and to remove the handicaps under which her rubber industry is working, it would seem that very soon, perhaps even in 1960, Indonesia may take second place to Malaya as the world's greatest rubber producer.

Research

As I have already mentioned, the Government, the industry and organized labour in Malaya are working harmoniously together and this teamwork augurs well for the future of Malaya's rubber. Government and industry have not only co-operated in the replanting schemes but have also joined forces in the field of research.

During 1959 Malaya's first Controller of Rubber Research, Sir Geoffrey Clay, took over as the chairman of the Malayan Rubber Fund Board.

Continued on page 829

New Chairman

Mr William Anderson has been appointed chairman of the Rubber Growers' Association. Born and educated in Scotland, Mr Anderson first joined Boustead and Co. Ltd. in 1924 and went out to Malaya in that year where he was connected with the company's estate agency business

W. ANDERSON

in the Penang area. He was interned by the Japanese during the war and on its completion rejoined Boustead's in Kuala Lumpur. He was vice-president of the Malayan Planting Industry Employers Association, and was also vice-president of the United Planting Association of Malaya. Since 1954 he has been a member of the Rubber Growers' Association.

New Vice-Chairman

Mr Charles Jackson has been appointed vice-chairman of the Rubber Grower's Association. In 1924 he was appointed Rubber Superintendent of the Anglo-Dutch Plantations of Java Ltd. (now the Anglo-Indonesian Plantations Ltd.) which then had over 28,000 acres planted with rubber. He was appointed to the Board in 1950, becoming successively managing director, deputy chairman and, in 1956, chairman. He was elected to the Council of the RGA in 1952 and is a member (1957-1960 Convenor) of the Indonesia Committee and vice-chairman of the Indonesia Association.

CHARLES JACKSON

Plantation Commentary

TAKING STEPS TO CATCH THE THIEVES

by our Malayan Correspondent

IT is impossible to say how much of the estate rubber produced in Malaya is stolen, but the figure is undoubtedly high and in some areas managers have estimated that 10% or even more filters away in this manner.

Selangor is one of the few States so far to try and tackle the problem on a rational basis, for the police seem largely incapable of checking it. The State appointed three rubber inspetors and the annual report of the Selangor Planters' Association said that the association had urged that more should be appointed. Last year 229 thefts were reported to the association, though it deplored the fact that not all planters were reporting their losses making the keeping of records difficult. In the first three months of this year there were only 37 thefts, a considerable reduction.

The inspectors are employed to check the books of rubber dealers and are empowered to do so without notice. They are able to spot discrepancies and ask the dealer to account for them, such as a sudden and large increase in the amount of rubber produced by a smallholder which is out of all proportion to the areas he has under rubber. On the recommendations of the inspectors, the rubber dealers can be deprived of their licences.

Johore State has not yet got inspectors, and the annual report of the Johore Planters' Association said that thefts were now reaching serious proportions. The thefts were well organized and it would appear that the proceeds of stolen rubber were in some cases going to Chinese secret societies. In other cases stolen rubber may be benefiting subversive 'political agents' as on one estate Communist posters and leaflets had been stuck on the trees.

The general opinion among planters in Malaya seems to be that the checking of rubber thefts and establishing an inspectorate should now be handled as a Federal matter and a countrywide system of checking introduced. There have been suggestions that this might be financed from a cess on rubber. There have also been demands for a reduction in the number of rubber dealers' licences issued and for a rubber patrol force.

Profits must indeed be considerable. There have been many reports of lorry loads of rubber being stolen for which the thieves might expect to get at least 1s. a lb. from the receivers.

Beaufils in Malaya

The Rubber Research Institute of Malaya hopes within two years to have some indication of whether the Beaufils technique of physiological diagnosis is applicable to Malaya. The technique has been developed to some extent in Vietnam and scientists from the institute who visited that country in 1959 saw areas where application had resulted in increased latex yields of between 12 and 35%.

Studying the technique in Malaya is being given high priority by the institute and was mentioned recently as one of the important projects being undertaken by the institute by the Controller of Research, Sir Geoffrey Clay. It is hoped to find out whether leaf and latex analysis is worthwhile in Malaya in providing a rational way of fitting fertilizer applications to the tree's requirements.

The system is not entirely new. In many cases it is possible by visually examining a tree to spot whether there are any deficiencies but wherever multiple deficiencies have been suspected the institute has analysed the leaves and the results of the unhealthy are compared with the results of healthy leaves collected from the same area.

The method worked out by M. Beaufils in Vietnam aims at discovering whether trees which appear healthy but are not yielding as they should, are suffering from a deficiency or a number of deficiencies. By sampling trees in a field it should be possible at the end of each year to prepare manuring programmes for the following years.

With this method each field must be treated as a unit. The information gained from a tree in one area would only be used on trees in that area and not on adjoining fields. It would mean, if the system is adopted in Malaya, that all fields on an estate will be considered individually every year. Routine fertilizer schedules will not be given.

In each field sampled the trees will have been planted at the same time and from the same clone. A sample is taken from about one tree in 100, the sample being a spur shoot leaf or a leaf on a branch of limited growth. Latex is taken from the cup or the tappers' bucket.

In Vietnam, Malayan scientists found during last year's visit, laboratories had been constructed and a permanent laboratory staff recruited on some estates. The organization required using this method is such that it is necessary to be positively certain before it is recommended for Malaya.

It is agreed that success in Vietnam shows that the method of diagnosis is valid and that the mineral nutrition of the tree is a major limiting factor there. It is not known whether this is a limiting factor in Malaya. Experience in Vietnam is that in the first year there are large fertilizer requirements but subsequently less is needed and the need for different mixtures appears. The application of the fertilizer is carried out in the normal way by the estate labour force after the estate manager, who would send the leaves and latex back to the laboratory, has got back recommendations on the fertilizer mixtures to be used in particular fields.

The Malayan experiment indicates that the fertilizer should go down during the wintering period, which is March and February. The leaves and latex should be collected during the latter months of the previous year. An attempt is being made to find out whether it is absolutely necessary to use the particular leaves that are taken in sampling at present.

As part of the experiments being carried out with the Beaufils method, the institute is attempting to establish once and for all the worth of fertilizers with rubber trees, for there are still some Doubting Thomases. In the experiments a control section is used with no fertilizer, another section gets fertilizer in line with the present schedules recommended by the institute and a third is given fertilizer in line with the results of leaf and latex analysis.

In connexion with leaf and latex analysis, work is to start soon on the injection of nutrients into rubber trees. It is hoped that this will improve both the physical properties of latex and the yield of rubber particularly by allowing latex to flow more freely. In many coastal areas of Malaya there has been trouble with pre-coagulation of the latex on the cut although the trees are otherwise in good health.

Work in Vietnam has shown that it is a rapid method of getting results. About three holes are drilled in the trunk of the tree and a plastic tube inserted into the orifices. Tablets or pellets of fertilizer are injected. It is hoped that this will be quicker than adding fertilizers to the soil.

Estate Training

Increased interest is being shown by Malayans in courses now being offered on British estates for training as assistant managers which will eventually lead to promotion to estate manager. Normally there are many more applications than there are places open.

This year, Guthrie and Co. Ltd. are to recruit eight youths for training in addition to the 41 already recruited since the scheme started five years ago. They will get two years' training on rubber estates being posted in pairs to estates as cadets in the first place. At the end of the first year they are transferred to different estates. The cadets,

Continued on page 824

Rubber Statistics

YEAR-END TOTALS FOR CANADA AND JAPAN

THE Secretariat of the International Rubber Study Group, in its latest Statistical Bulletin, has published details of the rubber position for Canada and Japan up to the end of last year.

Canada

Canadian imports of natural rubber during 1959 totalled 45,939 tons, and included 3,690 tons of latex; this represented an increase of nearly 7,500 tons compared with the previous year. These imports came mainly from Malaya (33,824 tons, thus absorbing almost all of the year's increase), but smaller quantities also came from Ceylon (4,284 tons) and the USA (5,852 tons).

Consumption of natural rubber during this period totalled 44,272 tons, including 3,337 tons of latex, an increase of some 7,000 tons over the previous year's figure, while stocks at the end of the year stood at 3,801 tons of crude and 346 tons of latex.

Home production of synthetic during 1959 fell by some 35,000 tons to 100,682 tons, largely as a result of protracted strikes in the industry. This total included 61,297 tons of S-Type and 19,111 tons of butyl. Imports of synthetic brought in 30,558 tons, practically all from the USA, an increase of some 19,000 tons compared with 1958 towards the shortfall brought about by the decline in the domestic production.

Canadian consumption of synthetic amounted to 57,212 tons in 1959, an increase of 10,500 tons compared with 1958, while stocks of synthetic fell during the course of the year from 10,351 tons as at the beginning of January to 8,940 tons at the end of December.

Reclaim production during the year totalled 6,229 tons, only very slightly more than in 1958, while imports rose from 9,617 tons to 11,960 tons, of which 1,097 tons came from the UK and 10,863 tons from the USA. Consumption of reclaim went up from 15,121 tons to 17,073 tons, and stocks at the end of the year stood at 1,664 tons, having totalled only 1,400 tons at the beginning of January.

Japan

Imports of natural rubber into Japan during 1959 totalled 157,653 tons, including 140,462 tons of crude and 17,191 tons of latex. This represented an increase of nearly 28,000 tons compared with the previous year, or some 22%. These imports were taken from Malaya (117,437 tons), Indonesia (3,860 tons), Thailand (13,382 tons), Ceylon (8,628 tons) and British Borneo (12,026 tons); imports from the latter source were more than doubled compared with the previous year.

Consumption of natural rubber during the course of the year totalled 144,130 tons of crude and 14,620 tons of latex, or over 30,000 tons more than in 1958, representing an increase of some 24%. Stocks at the end of the year stood at 13,983 tons, including 3,712 tons of latex, a reduction of somewhat more than 1,000 tons during the course of the year.

Imports of synthetic rubber during 1959 totalled 41,195 tons, of which 36,043 tons came from the USA and 4,327 tons from Canada; this was some 2½ times the 1958 import figure. Consumption of synthetic during the year totalled 32,110 tons, or nearly twice the previous year's consumption of 16,520 tons. Stocks of synthetic at the year-end amounted to 12,136 tons, having risen to this level from a figure of 3,050 tons at the beginning of the year.

PLANTATION COMMENTARY

Continued from page 823

in addition to their practical training, are expected to study estate practice, agricultural science, estate book-keeping and estate survey. Under training in the Guthrie scheme the cadets get a subsistence allowance of £28 a month.

At the end of their training they become assistants on estates on a four-year contract at a basic salary of about £40 a month and assistants can apply after three years' service for a scholarship for a two-year-diploma course at the University of Edinburgh.

Despite these attractive terms, of the 41 so far recruited 17 are now assistants on estates, 12 are still under training and the rest, 12 of the would-be managers, have left.

The Rubber Industry (Replanting) Board are also offering three scholarships for a course at the College of Agriculture in Malaya. The holders will afterwards be appointed replanting officers. More than 150 youths have applied, most of them Chinese.

The Rubber Research Institute is to expand considerably during the next three years its smallholders' advisory service which is responsible for visiting Malayan smallholders and advising them on the latest techniques and ways of improving rubber production. It hopes by then to have 40 rubber instructors and 300 assistant rubber instructors against the 21 rubber instructors and 90 assistant rubber instructors in the service at present.

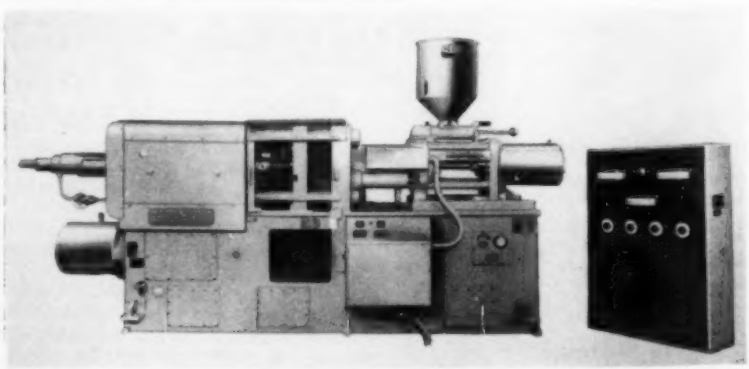
BOOK REVIEW

BRITISH PLASTICS YEAR BOOK 1960 (Iliffe and Sons Ltd. 696 pages. 42s. net. Postage 1s. 9d.).

The 1960 edition of British Plastics Year Book maintains the features which make it of such value to all in any way connected with or interested in the plastics industry. Three of the nine sections comprise classified lists of manufacturers and suppliers of materials, finished products and equipment. A most comprehensive list of trade names, with a definition of each product and the name of the manufacture, is included in a further section.

Nearly 7,000 company names and addresses appear in two address sections, the second of which lists 4,000 overseas firms. Prominent people actively engaged in the industry are included in an enlarged Who's Who. The extremely useful set of tables giving comparative properties of plastics materials has been revised and this section includes also a glossary of technical terms, specifications relating to plastics and a list of new companies registered during 1959.

∴ Copies may be ordered through the Books Department, RUBBER JOURNAL AND INTERNATIONAL PLASTICS, Maclaren House, 131 Great Suffolk Street, London, S.E.1.



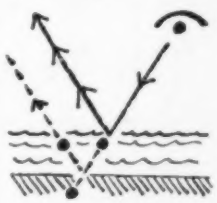
At the international plastics exhibition at Oslo, which ends this week-end, Peco have been showing their 30MS30 injection moulding machine; 127g. is moulded per shot (single feed, polystyrene) and 183g. (double feed). Plasticizing capacity is 40.7 kg./hr.

Electrical Aids in Industry *Data Sheet* **No. 13**

Infra-Red Heating

Infra-red heating is the name given to the method of using in industrial processes radiant heat from heaters specifically designed for that purpose. This differentiates it from methods employing both radiation and convection, as in furnaces, although the effect of the radiation is much the same in both cases.

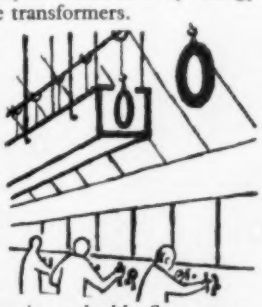
Radiant heat provides a higher rate of heat transfer to bodies not highly reflective than does convection, unless high-velocity forced convection is used. The rate of heating of a body depends upon the intensity of radiation on its surface, the proportion absorbed by the surface and, subsequently, on heat conduction. In heating very thin bodies, for example paint films, the radiation not reflected nor absorbed passes through and is in turn reflected or absorbed by the underlying material. This reflected heat is partly absorbed by the paint film "on the way back". Despite this effect it is an exaggeration to claim that infra-red "heats from the inside out" and it remains largely a surface heating effect except in a few special cases.



Infra-red heaters mainly use metal-sheathed elements in special reflectors, but infra-red lamps with internal reflectors are still used in special cases. Other types use silica-sheathed elements or quartz-sheathed lamps in reflectors. A wide range of heaters is available with simple mounting arrangements to enable heat to be applied quickly and effectively either in a production line or in some odd corner.

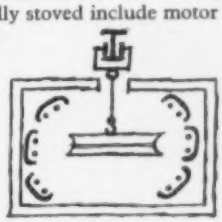
Control of the charge temperature is effected by regulating the heating time and power. In the case of a moving charge, this is done by adjusting the conveyor speed and the number of heaters in circuit, i.e., by adjusting the effective length of the oven. Some of the heaters may be controlled by energy regulators or adjustable transformers.

The advantages of infra-red heating over convection heating include reduced heating times, reduced floor space, lower installation costs, almost instant starting, ability to focus the heat, and flexibility in effective oven length. Infra-red ovens can often be mounted in the roof, saving valuable floor space. Infra-red heating is not generally favourable for heating large bodies of low heat conductivity.



Paint Stoving

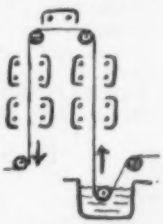
Not all paints are suited to infra-red radiation, but suitable paints are stoved quickly and often give a better finish. Synthetic enamels are the most suitable. Articles successfully stoved include motor car bodies, wheels and other accessories, refrigerator and washing machine cabinets, cylindrical drums and barrels, metal furniture, valve hand wheels, metal toys and a host of other articles. Lacquers and varnishes are being quickly and effectively stoved on jewellery, packing strips, tubes, films and similar products. Special infra-red lamp ovens stove synthetic finishes on wooden furniture and components. In all cases stoving times have been reduced very considerably.



Moisture Extraction

Sheathed element heaters are particularly useful for drying surface water films, their radiation being readily absorbed by water. High rates of drying are possible provided the water vapour can readily disperse. Drying of "contained" water can be effected provided the water can diffuse from the interior at a rate equalling the surface drying rate. With heat-sensitive materials sheathed element heaters may have to be arranged to move away from the material to avoid overheating if the conveyor stops, being interlocked with the conveyor for this purpose. Lamps are sometimes used instead for such materials because of their instantaneous cut-off.

Infra-red is widely used for drying coatings and inks on paper and textile products, bottle seals and labels, clayware and glazes, pigments on leather and many other products.



Plastic Heating

Infra-red heating is widely used in the plastics and allied industries. Typical applications are the preheating of plastic pellets and of sheets prior to moulding, curing of plastic and rubber sheets and belts, heat setting of nylon and similar fabrics, drying and curing of latex films on carpets and many others where a plastic forms the whole or part of the product.

The above are just a few examples of successful applications of infra-red. In many other processes infra-red heaters can often be fitted quickly and cheaply, to save time, labour and floor space and, therefore, money.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books on electricity and productivity (8/6 each, or 9/- post free) are available — "Resistance Heating" is an example; "Induction and Dielectric Heating" is another.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity. Ask for a catalogue.

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PATENT SPECIFICATIONS

The following information is prepared from published Patent Specifications by permission of the Controller of H.M. Stationery Office. The full Specifications can be obtained from the Patent Office, 25 Southampton Buildings, W.C.2, at 3s. 6d. per copy (including postage).

Bonding Rubber to Polyurethane

No. 829,564. Lord Manufacturing Co. Application and Filed, April 24 1956. Application in USA, April 29 1955. Published, March 2 1960.

Polyurethane rubber or resin is bonded to natural or synthetic rubber by means of an adhesive composition comprising three components, namely (1) an organic isocyanate, (2) an aromatic nitroso compound, and (3) a film-forming material which is a synthetic resin, natural rubber or a synthetic rubber. The components of the adhesive composition may be applied separately to the surfaces to be bonded, but preferably the three components are dissolved or suspended in a solvent and the solution applied to the surface of the polyurethane. Both the polyurethane and the natural or synthetic rubber are in the unvulcanized condition when the adhesive is applied, the assembly of polyurethane, adhesive and rubber being heated under pressure to effect vulcanization. Suitable isocyanates and nitroso compounds are listed and examples are given of the use of the process for bonding polyurethane rubber to natural rubber, SBR and neoprene.

Resinous Materials

Nos. 826,652-3. Pittsburgh Plate Glass Co. Application and Filed, November 23 1955. Application in USA, February 24 1955. Published, January 13 1960. No. 826,653 divided out of No. 826,652.

826,652.—Resinous materials are prepared by condensing formaldehyde or other monoaldehyde with an interpolymer containing acrylamide, the condensation being conducted in the presence of an alkanol and under etherification conditions. The interpolymer containing acrylamide is prepared by polymerizing acrylamide with ethyl acrylate or other monomer or with two monomers, *e.g.* ethyl acrylate and styrene.

826,653.—The resinous materials prepared according to Specification No. 826,652 are blended with other resins, such as alkyd resins, epoxy resins, epoxidized oils, nitrocellulose and urea and melamine resins.

The resinous materials and their blends as above form films which possess many outstanding characteristics including high hardness, toughness and impact resistance. They are useful in paints and other coating compositions as well as for other purposes. They may be combined with fillers, pigments and like material to give various combinations of properties.

Shorter Abstracts

Stabilization of Polyolefins. 827,661. The Dow Chemical Co. Filed, July 27 1956.—Polythene and other polyolefins prepared by the Ziegler process and containing catalyst residues are stabilized by treatment with a vapourized active hydrogen compound before the polyolefin is exposed to air, the vapourized compound being subsequently removed. The active hydrogen compound may be an aliphatic alcohol, water or certain other chemicals.

Latex Sponge Rubber. 828,643. United States Rubber Co. Filed, May 31 1957. — Azo-di-carbonamides and aryl sulphonyl hydrazides are claimed as blowing agents for addition to latex to form latex sponge rubber.

IRI Golf

SCOTTISH SECTION

The grass was so rough when the Scottish Challenge Cup and qualifying round was played at Glenbervie on May 5 that scoring was high and quite a number of contestants tore up their cards in disgust.

Leading scores: T. W. W. Davie, 82—7, 75; A. Bell, 79—4, 75; W. Alexander, 82—6, 76; W. Johnston, 93—17, 76; J. Campbell, 96—19, 77; J. McKechnie, 87—10, 77; R. Barber, 93—16, 77; and D. Pratt, 98—19, 78.

Prizes were donated by G. Hardie, W. Johnston, W. Boyd, J. McKechnie and J. Campbell. The cup was held over for a play off later in the season.

The secretary, J. M. Gallie, intimated that he would see next year's Wallwork Final through, but as he would then be taking over the captaincy, it was essential that the section should consider the appointment of a new secretary. J.M.G.

UK Trade with EEC

IMPORTS AND EXPORTS OVER FIVE YEARS

STATISTICS covering plastics materials, man-made fibres and synthetic rubber were given in a written answer to a Parliamentary question from Mr T. H. H. Skeet, M.P. for Willesden E.

The question asked for details covering the production of these materials in the UK during each of the last five years and the value of trade in these items with West Germany, France and Italy. Mr John Rodgers, Parliamentary Secretary to the Board of Trade, gave the figures in the table below, with the added comments that production figures for plastics materials were not available, and figures given are sales by UK manufacturers. The values relate only to the materials as they are listed, and do not include any allowance for the content in finished and semi-finished products.

Year	UK Production	Value of UK Trade					
		West Germany		France		Italy	
		UK Imports £	UK Exports £	UK Imports £	UK Exports £	UK Imports £	UK Exports £
Plastic materials:	(Thousand tons)						
1955 ..	316	2,334,290	304,809	259,044	866,284	381,424	796,465
1956 ..	336	2,416,099	348,586	261,988	1,629,508	252,995	1,194,847
1957 ..	391	3,250,469	723,407	477,218	2,088,502	406,905	959,673
1958 ..	416	4,171,044	1,340,664	539,016	1,964,617	664,413	1,089,386
1959 ..	501	5,350,975	1,308,975	664,878	1,851,611	563,133	1,471,553
Man-made fibres:	(Million lb.)						
1955 ..	473	250,590	36,404	15,762	27,843	1,318	41,720
1956 ..	483	141,677	77,390	18,951	118,046	138	43,088
1957 ..	496	92,889	122,412	17,698	22,748	8,693	83,963
1958 ..	422	110,341	180,744	35,586	16,822	14,117	75,679
1959 ..	515	71,003	130,506	43,874	31,135	1,886	116,313
Synthetic rubber:	(Tons)						
1955 ..	Nil	31,575	52	—	10,222	—	611
1956 ..	Nil	42,850	26	197	10,074	—	398
1957 ..	750	3,426	1,194	34	10,097	—	160
1958 ..	11,300	5,849	27,652	11	10,399	187	16,785
1959 ..	56,990	16,138	81,351	50,135	252,043	53,694	63,229

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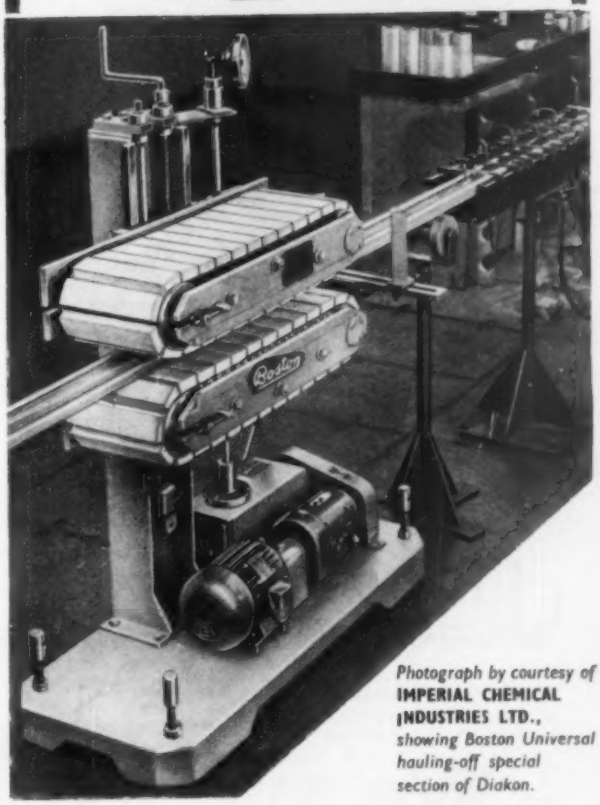

Photograph by courtesy of **IMPERIAL CHEMICAL INDUSTRIES LTD.,** *showing Boston Universal hauling-off special section of Diakon.*

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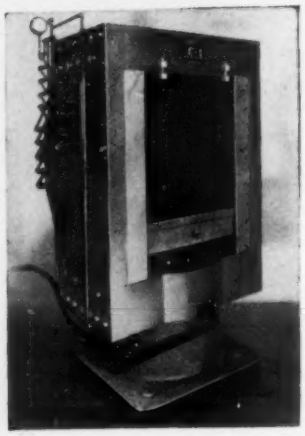
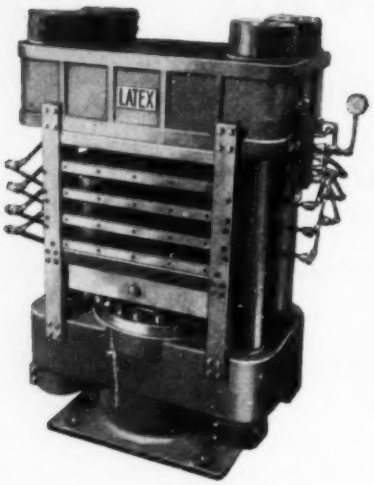


4-Column Press
1,000 tons



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Plantation Share Survey

SINCE we last commented on plantation affairs the price of rubber in London has touched its highest level since late September 1955. Reason for this rise was a continuation of the technical 'squeeze' on prompt supplies of rubber.

The INTERNATIONAL RUBBER STUDY group has pointed out that world consumption of natural rubber this year will be 2,110,000 tons or a little below the estimated production of 2,135,000 tons. Moreover, a further 75,000 tons are likely to be released this year from both British and American government stocks. The Study Group considers that the total surplus of some 100,000 tons will be required to build up commercial stocks to normal levels. The present below normal level of stocks in the hands of most manufacturing groups is one of the reasons for recent unhealthy price fluctations in the commodity market. World production of synthetic rubber this year is estimated at 1,810,000 tons against consumption of 1,750,000 and a production capacity of 2,335,000 tons in member countries.

Meantime, in the Stock Market itself, there has been news of further important linkups between individual companies. The plan to merge seven of the HARRISONS AND CROSFIELD companies has created considerable and lively interest. It has also received an enthusiastic reception. The shares of all the proposed participants have improved demonstrably since the scheme was announcer earlier this month.

The 'marriage' of the seven companies recommended by the respective boards is to be effected by an exchange of shares into a new holding company with LONDON SUMATRA PLANTATIONS (*RJIP* May 14, 722).

The companies concerned are UNITED SERDANG (SUMATRA) RUBBER PLANTATIONS, ALLIED SUMATRA PLANTATIONS, LANKAT RUBBER COMPANY, MENDARIS (SUMATRA) RUBBER AND PRODUCE ESTATES, SOENGEI RAMPAH RUBBER AND COCONUT PLANTATIONS, TANDJONG RUBBER COMPANY, TOERANGIE (SUMATRA) RUBBER AND PRODUCE ESTATES.

The share exchange terms (2s. shares in all circumstances) based on the relative profit earning potentialities of the companies estates as jointly assessed by the boards, are as follows:—

	London Sumatra shares	Present holdings shares
United Serdang ...	2	5
Allied Sumatra ...	3	10
Lankat	1	2
Mendaris	1	5
Soengei Rampah ...	1	3
Tandjong	2	5
Teorangie	9	10

In order that the merger shall be be equitable when considered by reference to sterling assets (including trade investments) four of the companies will declare special dividends payable to existing holders conditionally on the offers becoming effective. These special dividends will be in addition to interim or final dividends concurrently being announced by five of the companies.

In addition to significant advantages of efficiency and economy in administering the estates the merger will lead to a reduction of sterling expenditure. It will also reduce the total sum which must be retained by the group in liquid form to finance current requirements and enable the group to pursue a more consistent dividend policy than by the present companies individually.

In the event of a 100% acceptance, the issued capital of LONDON SUMATRA RUBBER will exceed £1 million. The group will control over 71,000 acres of rubber as well as 8,000 acres of oil palms, yielding at present some 17¾ million pounds of rubber annually and capitalized at a mere £13 per acre.

At present quite substantial rupiah profits are being earned by the Indonesian Rubber producers but permitted remittances to this country are meagre and for some time investors have found little attraction in the shares of such companies except on a basis of sterling asset values.

In this respect LONDON SUMATRA will start off in a good position with sterling liquid assets equivalent to about 1s. 9d. a share.

The HARRISONS AND CROSFIELD group manages several other companies with Sumatran interests which, for various reasons have not been included in the 'get together.' The most interesting to some folk is BAH LIAS RUBBER, CENTRAL SUMATRA RUBBER and SIALANG RUBBER. Depending upon the outcome of the LONDON SUMATRA plan it seems likely that a similar arrangement covering these three companies, which between them hold the whole of the issued capital of KULAI RUBBER, a highly successful private Malayan rubber producer, will materialize in due course.

The latter company has an estate of 3,202 acres of rubber, all but 15 acres of which consists of pedigree stock and secured a crop of 2,372,500lb. in 1958, equivalent to 937lb. per acre from the mature area. It earned a profit of over £130,000 from which a 50% dividend was distributed. Its financial position is very strong. Net liquid assets standing at £138,000 apart from trade investments worth £165,000.

The RGA MEETING

Continued from page 822

To assist the Malayan Rubber Fund Board, a Co-ordinating Advisory Committee which will include leading scientists and representatives of rubber manufacturers is to be set up in London. The Rubber Producers' Council which represents all sections of the rubber plantation industry in Malaya had the right to nominate two persons on this new committee, and I think it will show how united all these sections are when I say that they unanimously chose two of our Council members, Mr H. B. Egmont Hake and Mr E. D. Shearn as their first representatives.

We are expecting much from our rejuvenated research effort and as natural rubber producers we will do all that we can to ensure its success. We are also looking forward to the co-operation of the other side of our industry, namely the rubber manufacturers. They too can benefit from our research. One of the leading manufacturers has already gone on record in saying 'It seems clear that research efforts in natural rubber should be directed towards increasing the supply and reducing production costs. In the long run, this will serve the best interests of producers and consumers alike rather than attempts now to find new uses for natural rubber.' It would be interesting and helpful to know if this view is held by manufacturers in general.

The Common Problem

It does seem to me that there is a common problem facing both sides of our industry at the moment. This may be simply stated as a shortage of natural rubber. Although releases from stockpiles will help to meet it, so long as this shortage remains the price of our product may continue to be relatively high and unstable. Instability of price benefits neither the producer nor consumer. While high prices for rubber may bring rubber producers short-term benefits, they also stimulate the manufacturer in his quest to find substitute materials that will make him less and less dependent on the natural product. Taking a long view therefore, high prices today may result in the loss of our markets tomorrow. In these circumstances it is necessary in my opinion to do everything possible to ensure that greater supplies of low-cost natural rubber are coming forward as quickly as possible. If our research effort can do anything to accelerate this I feel that it will be well worthwhile. By doing so it should help us to attain that stability of price which is in the interest both of producers and consumers, without the need of artificial measures such as buffer stocks and marketing boards which have been advocated in some quarters.

There are challenging years ahead—years, I also hope, of great opportunity for all engaged in the rubber producing and allied industries.

Rubber Markets

LONDON

Covering of near positions again featured the market, but initial firmness of values was followed by an easier trend, in sympathy with Singapore. Only a patchy demand came from consumers and dealers were apparently unwilling to take on new commitments, except where outlet was assured.

Latest prices are as follows:

No. 1 RSS Spot: 39d.-39½d.

Settlement House:

June 38½d.-38⅝d.

July/September 36⅝d.-36⅝d.

October/December 34⅝d.-34⅝d.

January/March 33½d.-33½d.

April/June 32⅝d.-32⅝d.

No. 1 RSS cif basis ports:

June 36⅝d.-37d.

July 36½d.-36⅝d.

Godown:

June 125½ Straits cents nominal.

LATEX

Centrifuged latex per gallon in drums, seller, June 20s. 1d., July 20s. 11d., cif European ports, Spot, seller, 21s. 6d. Bulk, 20s. 8d. Creamed, seller, June 20s. 7d. Normal, seller, June 16s. 10d.

DJAKARTA

The market on May 23 was weak in the morning owing to lack of interest from the buyers' side. In the afternoon, the market was steady after being easy with sheet No. 1 (about 25 tons) traded at 58½ rupiahs per kilo.

	Rupiahs per kilo	
	May 23	Previous
Spot No. 1 Priok ..	57.00b	58.00b
Spot No. 2 Priok ..	56.00b	56.50b
Spot No. 3 Priok ..	51.00b	51.50b
No. 1 fine pale crepe, spot	46.50b	47.00b

Tone: Steady.

CEYLON

No. 1 RSS

The price of No. 1 RSS at Colombo on May 23 was 152½ (154½) Ceylon cents per lb.

AMSTERDAM

The Amsterdam rubber market ruled as under on May 23:

	Guilders per kilo	
No. 1 RMA:	May 23	Previous
May	3.66	3.66
June	3.63	3.63
July	3.58	3.58
August	3.58	3.58
September ..	3.58	3.58
July/September ..	3.58	3.58

Sales: Nil. Tendency: Quiet.

SINGAPORE

Very quiet conditions prevailed on May 23. Fluctuations were small but sellers were inclined to be more reserved towards the end of the morning session. Lower sheets were quiet. In the afternoon, prices moved about one cent over the noon levels due to sellers being reserved, but exchanges were small. June and July narrowed owing to some business being recorded at two cents lower. Sheets were in limited demand and the differentials tended to narrow slightly. Factories showed little interest. After hours, the market was quiet with No. 1 June buyers 1¼ Malayan cents below Friday's final level at 128¾ Malayan cents per lb.

	Straits cents per lb. fob Malayan ports to open ports	
	May 23	Previous Close
No. 1 RSS, June	128⅜–128⅝	129½–130
July	126½–126½	126 –126⅜
No. 2 RSS, June	125⅛–126¼	126 –126½
No. 3 RSS, June	119 –120	119½–120¼
No. 4 RSS, June	116⅜–117¼	116¼–117¼
No. 5 RSS, June	111¼–112½	111⅜–112⅜
No. 1 RSS, Spot	130 –131	132½–134
No. 3 blanket, thick remilled, crepe, June ..	114 –116	114½–116½
No. 1 fine pale crepe, June ..	133½–135½	134 –136
2X thin brown crepe, June ..	113½–114½	113 –114

Tone: Quiet.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums fob at 243.60d. per gallon.

NEW YORK

The New York rubber market ruled as under on May 23:

DEALERS' PRICES

	US cents per lb. ex-dock	
	May 23	Previous
No. 1 RSS, June ..	43⅜n	44s
July ..	43⅜n	—
No. 2 RSS, June ..	43⅛n	43⅛s
July ..	42⅞n	—
No. 3 RSS, June ..	42⅝n	42⅝n
July ..	42⅜n	—
No. 1 RSS, Spot ..	45s	45n
No. 3 amber blanket, crepe, August ..	39⅜n	—
No. 1 latex, thin crepe, June ..	45⅜n	—
No. 1 latex, thick crepe, June ..	45n	—

FUTURES—REX CONTRACT

	May 23	Previous Close
May ..	44.35b—45.00a	44.75b—45.50a
July ..	42.15b—42.35a	42.80t
Sept. ..	40.65b—40.70a	40.76t
Nov. ..	39.85b—39.90a	39.90b—40.05a
Jan. ..	38.90b—39.10a	39.20b—39.60a
Mar. ..	38.30b—38.60a	38.50b—38.90a
May ..	37.40b—37.70a	37.60b—38.00a

Sales: 48. Tendency: Steady.

Rubber futures were softer on May 23 on scattered selling in moderate dealings. Traders said that physical rubber was quiet with prices barely steady.

BANGKOK

No. 1 RSS

The price of No. 1 RSS at Bangkok on May 23 was 39.00 (39.12½) US cents per lb.

COMPANIES in the NEWS

Francis Shaw

In spite of keener competition, Francis Shaw has improved its position in many overseas markets, Dr J. G. Mackay, the chairman reported at the company's annual general meeting. Delivery is almost complete of the firm's share of the contract from Rustyfa to supply plant and machinery for the large tyre factory at Dneprope-trovsk, USSR.

Substantial orders have been placed with the company during the past five months. Group trading profit increased from £370,004 to £539,588. Final ordinary dividend of 12½% was declared.

Storey Brothers

An outstanding year was reported by Storey's chairman, Mr J. H. Storey. Sales and profits in 1959 were the best ever recorded. Net profit before taxation was £980,450—an increase of £338,688. Final dividend was 22½%, making a distribution of 30% for the year.

Mr Storey referred to what he called the great potentialities of 'Plastolam' — PVC sheet bonded to steel—on which Storey's are carrying out a good deal of work in conjunction with other firms.

Reichold Chemical

Walter H. Breuer, at the annual general meeting of Reichold Chemical, drew attention to the company's considerable capital expenditure programme. The phthalic anhydride plant extension was brought into service last December and was providing a welcome addition of this raw material, of which there was still a world-wide shortage.

'There has been a sustained increase in the demand for polyester resins,' Mr Breuer went on 'and in order to meet the volume of requirements in this direction it is essential to plan a substantial increase in resin production.'

The Vinyl and Vinatex companies continued to expand, and in order to meet the increasing demand for PVC a new factory is being built for Vinatex at Havant.

In October an interim dividend of 7½% had been declared. Final ordinary dividend declared was 15%.

Lewis and Peat (Singapore) Ltd., rubber and produce brokers, announced on May 24 that they had purchased the whole of the issued capital of W. H. Day and Co. Ltd., another rubber broking firm in Singapore, with an issued capital of 1,000,000 Malayan dollars.

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The ANALYSIS of RUBBER AND RUBBER-LIKE POLYMERS

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R.A.B.R.M. MANUAL No. 3

By WILLIAM C. WAKE
M.Sc., Ph.D.(Lond.), F.R.I.C., F.I.R.I.
HEAD of CHEMISTRY DIVISION
RESEARCH ASSOCIATION of BRITISH RUBBER MANUFACTURERS

THE first modern work devoted solely to this important subject to be published in the English language. In addition to the analysis of natural and synthetic rubbers, the author deals with rubber-like plastics such as Polyethylene, PVC, PVDC, PVA and Urethanes. Also discussed are the identification of compounding ingredients used in the manufacture of rubber and rubber-like polymers.

It will unquestionably become a standard work and is a "must" for all analysts interested in this subject.

CONTENTS:

Extraction Procedures - Qualitative Analysis for Polymer Type - Elemental Analysis of Extracted Polymer - Direct Determination by Functional Group Analysis - Solution and Dissolution Methods - Quantitative Cracking and Distillation Methods - Carbon Black in Rubber - Ashing, Wet and Dry, and the Determination of Trace Metals - Analysis of Extracts and Blooms - Statistical Aspects of Analytical Work.

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Industry INTELLIGENCE

Technical Data

Neo-Spangol T20

Neo-Spangol T20 is a colloid plasticizer available in the UK from Bush Beach and Segner Bayley Ltd., Marlow House, Lloyd's Avenue, E.C.3. A number of information sheets, Nos. 2-8, give details of the material which is said to permit the use of much higher proportions of crumb without impairing the physical properties, to aid dispersal of fillers, reduce the quantity of blowing agent required in cellular rubber and generally improve the processability of rubber stocks. Neo-Spangol T20 is also said to be compatible with all normal plasticizers.

Coumarone Resins

Bulletin 153/R/60, issued by Anchor Chemical Co. Ltd., Manchester 11, entitled 'Coumarone Resins in Rubber Compounding,' gives details of the history, manufacture and properties of coumarone resins, with particular reference to their uses in rubber compounding, which are as plasticizers, softeners and processing aids. Recommendations are made indicating the percentages of coumarone resin which should be used in various applications. Properties are given of a selection of the resins available which are of the greatest utility and around which most interest has centred.

New Pigments

Johnson, Matthey and Co. Ltd. announce the production of two new pigments, Matthey Titanate Yellow and Hatton Green, which possess excellent light fastness in full shade and in reduction as well as outstanding chemical resistance. Their thermal stabilities are greater than those of other pigments of comparable colour. Both colours are suitable for general use in the surface coating and plastics industries, and it is expected that they will find particular application in the formulation of stoving enamels, alkali resistant paints, cement finishes and emulsion paints for interior or exterior use.

Further information on the two pigments, in the form of reports listing the physical characteristics of typical batches, is available on application to the company's head office at 73-83 Hatton Garden, London, E.C.1.

Polysar Rubbers

Three new technical reports are available from Polymer (UK) Ltd., Walbrook House, Walbrook, E.C.4. Report No. 9:3A, Polysar Krynac NS Rubbers gives information on a new series of non-staining oil resistant copolymers of butadiene and acrylonitrile. These have much better non-staining characteristics than the corresponding Polysar Krynac grades which they are designed to replace, but are otherwise the same. All are produced by a cold emulsion polymerization method giving good physical and processing characteristics, and the new types may be used interchangeably with the corresponding old types.

Report No. 9:3B concerns a weather resistant white Butyl compound, based on Polysar Butyl HO2, which does not develop surface tackiness or crazing during prolonged outdoor exposure. Details of compounding and properties are given in the report, and the results of weathering tests.

Report No. 9:3C presents data on the adhesion of Polysar Krynol 652 Soling stocks to leather and fabric uppers and shows experimental procedures and results of a series of tests.

Butyl Rubber for High Voltage Insulation and Freezer Gaskets

The use of Polysar butyl rubber for high voltage insulation compounds and for freezer gaskets is described in two recent Polysar Technical Reports available from Polymer (UK) Ltd., Walbrook House, Walbrook, London, E.C.4.

High Voltage Insulation Compounds. Polysar Technical Report No. 9:1A, by H. A. Pfisterer.—The work reported in Polysar Technical Report No. 8:11B has been extended in the present report, in which additional high voltage insulation compounds based on Polysar Butyl 100 are given together with results of tests on the compounds and their vulcanizates.

Freezer Gasket. Polysar Technical Report No. 9:1B, by R. C. Klingender.—A formula is given for a light-coloured gasket for use on large commercial freezers. The compound is based on Polysar Butyl 402 and is odourless and tasteless. It is believed to be non-staining but it is suggested that a specific staining test with the vulcanized compound in contact with the actual freezer part should be undertaken. Data are given for the properties of the butyl rubber stock and its vulcanizate.

Machines, Materials and Equipment

Safety Periscope

When equipment and processes have to be inspected closely through the small openings of sight glasses, there is a danger of serious injury to operators if the viewing window should break. By using a periscope, the operator can stand well clear of the window while making observations of the interior of pressure vessels, furnaces and chemical plants.

An instrument manufactured by P. W. Allen and Co., 253 Liverpool Road, London, N.1, consists of a periscopic optical system of unit power, with a field of view of 35°, fully corrected and free from distortion. The optics are contained in a metal tube, 30ft. long and 1¼in. in diameter, which has a rubber eye shield and focusing sleeve at one end and a 90° prism at the other. Objects at any distance greater than 3in. from this prism can be focused. Low-voltage, high-intensity spot lights can be fitted on the end of the periscope. To make a complete survey of the interior of a vessel, it is only necessary to rotate and tilt the instrument in the inspection opening.

New Publications

Fortafil A70

I.C.I. metals division has recently brought up to date and reprinted its booklet on Fortafil A70, which is an amorphous hydrated sodium aluminium silicate of very small ultimate particle size. It is intended primarily for use in rubber as a reinforcing filler where lightness of colour and high degree of reinforcement are required. The booklet consists of 34 pages, 10 of which are devoted to general properties of Fortafil A70, the remainder dealing with its use in different applications and materials including various gelling compounds, direct vulcanization compounds, nitrile and neoprene rubber and in blends of nitrile rubber and PVC.

Two from Turners

Conveyor belting designed for a variety of applications—ranging from lump ores fed into blast furnaces to the conveyance of grain and other foodstuffs—is illustrated in a catalogue from Turner Bros. Asbestos, of Rochdale. Recent developments in the use of synthetic fibre carcases are dealt with; and high tensile conveyor belting, food conveyor belting and rough faced belting—for carrying materials up steeper gradients—are touched on.

After dealing with BSI specifications for the three grades of belting, the catalogue goes into the selection of belting in detail and the work of Turner's installation service. Another catalogue from the same company is called 'Poly-V Drives' (*RJIP March* 19, 436). It gives comprehensive data on service factors, horsepower ratings, pulleys, and installation and maintenance instructions.

Material Prices

Prices of materials appear regularly in RUBBER JOURNAL AND INTERNATIONAL PLASTICS on the last Saturday of each month. It will be appreciated if suppliers will give notification of any price changes and additions to or deletions from their range. Comments on the present materials and classifications are invited in order that the list may be made of maximum service to our readers.

pl—per lb pc—per cwt pg—per gallon pt—per ton ag—according to grade aq—according to quantity xs—ex-store xw—ex-wharf dp—duty paid sp—special prices for contracts del—delivered cp—carriage paid

Accelerators

Alpha plaq 5s. 8d.—6s. 4d.
Ancap plcp 3s. 8d.
Ancap Zinc salt plcp 2s. 10½d.
Ancatax plcp 4s.
Ancazate ME plcp 6s. 10d.
Ancazate Q pldel 6s. 4d.
Ancazate ZZ pldel 5s. 3d.
Ancazide ME plcp 6s. 2d.
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D.P.G. plcp 3s. 8d.
D.O.T.G. plcp 3s. 8d.
Dibenzo GMF plaq 27s.—28s. 6d.
Furbac plcp 5s. 3d.
Gamma plaq 10s. 6d.—11s. 3d.
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Robac 44 plaq 9s. 1d.—9s. 10d.
S.P.D. plaq 9s. 3d.—10s.
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T.B.U.T. plaq 15s.—16s.
T.E.T. plaq 6s. 6d.—7s. 4d.
Thiuram P.25 plaq 15s.—16s.
T.M.S. plaq 7s. 8d.—8s. 6d.
T.M.T. plaq 5s. 4d.—6s. 3d.
Vulcacit CZ pldeldp 7s. 1d.
Vulcacit F pldeldp 4s. 8½d.
Vulcacit NP pldeldp 11s. 2d.
Vulcacit Extra N pldeldp 8s. 1d.
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Antioxidant SP pldel 4s. 6d.
BLE-25 plaq 3s. 7d.—4s. 5d.
BXA plaq 3s. 6½d.—4s. 5½d.
Naugawhite plaq 4s. 9d.—5s. 6d.
Octamine plaq 3s. 9d.—4s. 6d.
Polygard plaq 3s. 7½d.—4s. 5d.
Wing-Stay S. plaq 3s. 8d.—4s.
Wing-Stay T. plaq 4s. 10d.—5s. 6d.
Wing-Stay 100 plaq 10s. 6d.—11s. 6d.

Compounding Ingredients

Barytes ptaqag £10—£40
Calcium Silicate plaqdel 9d.—10½d.
Calcene ptxwaq £52—£69 10s.
Carbonate, Light Mg. ptsp £97
Carbonate, Actidated Ca. ptaq £28—£30
Carbon Blacks:
Conductex SCF pl 1s. 2½d.
Furnex SRF pl 9d.
Magecol 888 SRF pl 7.33d.
Micronex MPC pl 11¾d.
Micronex W6 EPC pl 11¾d.
Regal 300 plaq 8d.—8½d.
Regal 600 plaq 10d.—10½d.
Statex B. FF pl 10½d.
Statex R. HAF pl 11d.
Statex 93 HMF pl 9½d.
Sterling SO FEF plaq 7½d.—7¾d.
Sterling V. GPF plaq 7½d.—7¾d.
Vulcan 6 ISAF plaq 10d.—10½d.
Vulcan C CF plaq 11d.—11½d.
Vulcan 3 HAF plaq 8d.—8½d.
Vulcan XXX SCF plaq 1s.2½d.—1s.2¾d.
China Clay ptxs £68 10s.
Factice Dark pl 1s. 0½d.
Factice Light pl 1s. 7d.
Kieselguhr Spanish White ptxs £37 12s. 6d.
Lithopone 30% plxs £68 10s.
Manosil VN3 ptaq £120 5s.—£150 5s.
Micafine Powdered Mica ptxs £67 10s.
Ochre Yellow pcxs £1 19s.
Oxide Light Mg ptsp £24 5s.
Oxide Red pcxs £4 3s.
Oxide Titanium 98% pcxs £8 8s.
Rutiox CR pcxs £9 3s.
Rubber Gen. Gran. Mineral. ptxs £35 5s.
Silica Hydrated ptxs £113
Sulphur Manox Insoluble pldel 1s. 9d.
Sulphur Powdered ptdel £20 17s.
Sulphur Sublimed Flowers ptxs £52 10s.
Talc Italian ptxs £28 2s. 6d.
Tufknit Durham CS plaq 8½d.—10½d.
White Lead Dry ptdel £122
Whitetex 2 Clay ptxs £40 10s.
Whiting ptxsaq £5 9s. 6d.—£7 7s. 6d.
Zinc Oxide pcdel £6

Plasticizers and Softeners

Abalyn pcaq 220s.—271s.
Al Stearate ptxwdp £253 10s.
Bisoflex 102 ptaq £513—£568
Butyl Ricinoleate plaq 2s. 6d.—2s. 6¾d.
But. Ac Ricinoleate plaq 3s. 0½d.—3s. 1½d.
Butyl Stearate ptaq £277—£282
Ca. Stearate ptxwdp £243 10s.
Diallyl Phthalate plaq 3s. 11d.—4s. 11½d.
Dialkyl Phthalate ptaq £221—£222
Dibutyl Phthalate ptaq £203—£204
Dibutyl Sebacate pl 5s. 10½d.
DiOA ptaq £354—£357
DiOS plaq 5s. 0½d.—5s. 2d.
DOA ptaq £414—£420
DOP ptaq £276—£277
DOS plaq 5s. 7½d.—5s. 9d.
Disobutyl Phthalate ptaq £196—£197
Diisosoctyl Phthlatate ptaq £221—£222
Dinonyl Phthalate ptaq £211—£212
DNS plaq 5s. 2¾d.—5s. 4½d.
Ester Gum pcag 130s.—150s.
Flexol 3GO pl 4s. 8d.
Hercolyn pcaq 242s.—249s.
Lankroflex ED3 plaq 3s. 2d.—3s. 2¾d.
Lankroflex 29 ptaq £216—£217
Lead Stearate ptxwdp £223 10s.
Methyl Ricinoleate plaq 2s. 4d.—2s. 4¾d.
Me. Ac. Ricinoleate plaq 2s. 11½d.—3s.0½d.
Polyglycol Oleate 400 pt £285
Reomol D79A ptaq £354—£357
Reomol D79S plaq 5s. 0½d.—5s. 2d.
Reoplex 100 plaq 6s. 1½d.—6s. 2¾d.
Reoplex 110 plaq 5s. 10d.—6s. 5½d.
Reoplex 220 plaq 5s. 6½d.—5s. 8d.
Reoplex 300 plaq 7s. 2d.—7s. 3½d.
Reoplex 400 plaq 4s. 2½d.—4s. 4d.
Rosin Oil pgag 8s.—18s.
Triphenyl Phosphate pt £382
Tricresyl Phosphate pt £236
Trixylyl Phosphate pt £203
Zinc Stearate ptxwdp £256

Solvents and General Chemicals

Acetic Acid ptdelaq £97—£106
Acetic Anhydride ptdel £128
Acetone ptdelaq £85—£128
Alcohol:
Absolute 74.5op pgdelaq 4s.0½d.—4s.4¾d.
Butyl ptaq £132—£193 10s.
sec-Butyl ptdelaq £128—£168
Ter-Butyl ptdelaq £172—£195
Isopropyl Tech.99%pgdelaq5s.—6s.5½d.
Butyl 'Carbitol' pt £283
Butyl Acetate ptaq £159—£217
Caprylic Acid ptdel £395
Carbon Bisulphide ptxs £71 10s.
Carbon Tetrachloride pgaq 12s. 4d.—20s.
'Cellosolve' Acetate pt £250
Cresol m- 98% pldel 4s. 9d.
Cresol o- 30/31°C. pldel 1s.
Cresol p- 34/35°C. pldel 5s.
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Ethylene pt £132
Polyethylene 200 pt £214
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" 400 pt £214
" 1,500 pt £264
" 4,000 pt £274
" 6,000 pt £294
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Isobutyl Acetate 80% ptaq £126—£185
Lauric Acid ptdel £273
M.E.K. ptdelaq £134 10s.—£143 10s.
M.I.B.K. ptdelaq £166—£209
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Naphtha Coal tar pg:
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Light 90—160 5s. 1d.
Palmitic Acid ptdel £147
Phenol pldelaq 1s. 4d.—1s. 7d.
Pyridine pg 16s. 6d.
Stearine ptag £108—£130
Toluol Pure/Nitration pg 5s. 8d.
Toluol 90's pg 5s.
Triethanolamine pt £224
Xylol 2/30 pg 5s. 9d.

PIGS New Captain

At a business meeting of the Plastics Industry Golfing Society, held in conjunction with the Sunningdale meeting, T. S. Crabtree (Arrow Electric Switches Ltd.) was elected captain for the ensuing period. P. J. L. Attwood (Hoover Ltd.) was appointed vice-captain.

The captain's prize, presented by Mr Crabtree, was won by L. C. Pendry, scoring 38 points in a Stableford bogey competition. R. P. Anderson was the runner-up with 36 points. The visitor's prize went to J. Young.

Prizes presented by 'Styrene Products' were played for with a Greensome bogey Stableford, the winners being F. A. Garrett, and T. S. Crabtree. Runners-up Messrs E. J. Lassen and R. G. L. Welham. Total entries 60.

The International Rubber Study Group in the April issue of the rubber statistical bulletin has revised several of its figures for the month of January 1960 as follows: Total stocks at end of month, 672,500; stocks in consuming areas, 197,500; exports from Indonesia, 44,878.

PATENT LIST

Printed copies of the Specifications in the following list, published by permission of the Controller of H.M. Stationery Office, can be obtained from the Patents Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d., including postage, but about six weeks after the date of this publication will usually elapse before they come available. Orders with remittance may be sent in advance to the Patent Office, and will be fulfilled immediately the Specifications are published.

COMPLETE SPECIFICATIONS ACCEPTED

Open to public inspection on April 13 1960

S. L. Ruskin. Polymerization of olefines. 832,483.

Bergwerksgesellschaft Hibernia A.G. Process for the continuous production of polyolefines of uniform molecular weight. 832,505.

Imperial Chemical Industries Ltd., E. Knowles, W. F. Smith, and J. F. Wood. Coating of articles with polyvinyl chloride compositions. 832,629.

Polymer Corporation Ltd. Grafting polymerizable compounds on to preformed naturally occurring polymers. 832,692.

British Rubber Producers Research Association. Process for the production of polymeric materials. 832,700.

W. T. Glover and Co. Ltd., Fibreglass Ltd., and British Resin Products Ltd. Electric cables. 832,797.

Midland Silicones Ltd. Organosiloxanes. 832,487.

Midland Silicones Ltd. Siloxane elastomers. 832,488.

Midland Silicones Ltd. Process for preparing high polymeric siloxanes. 832,489.

Badische Anilin- and Soda-Fabrik A.G. Production of acrylic compounds. 832,492.

British Industrial Plastics Ltd. Moulding presses. 832,712.

Manufacturers Des Glaces and Produits Chimiques De Saint-Gobain, Chauny and Cirey S.A. Des. Process and devices for the manufacture of mats of fibres, particularly glass fibres. 832,815.

Imperial Chemical Industries Ltd. Thermoplastic moulding compositions. 832,820.

Imperial Chemical Industries Ltd. Production of thermoplastic polymeric materials. 832,821.

Imperial Chemical Industries Ltd. Production of thermoplastic polymeric materials. 832,822.

Imperial Chemical Industries Ltd. Thermoplastic moulding compositions. 832,823.

Union Carbide Corporation. Epoxy heat-hardenable and heat-hardened compositions and a process for their preparation. 832,565.

Rohm and Haas Co. Polymer compositions. 832,567.

Badische Anilin-and Soda-Fabrik A.G. Production of acrylic compounds. 832,493.

Polymer Corporation Ltd. Grafting polymerizable compounds on to preformed polymers. 832,693.

Bendix Aviation Corporation. Method of and apparatus for removing flash from moulded articles. 832,738.

Farbenfabriken Bayer A.G. Process for the dyeing of polyacrylonitrile. 832,444.

E. I. Du Pont De Nemours and Co. Coating of fluorinated polymers. 832,874.

Dow Chemical Co. Oxyalkylation of solid polyols. 832,601.

Union Chimiques Belge S.A. Process for the polymerization of butadiene. 832,457.

Goodyear Tire and Rubber Co. Preparation of isoprene. 832,475.

Increases of Capital

E. Wykes (Leicester) Ltd. (295,919).—Rubber coverers and warpers, etc., 85 Asylum Street, Leicester. Increased by £200,000 in 4s. founders' shares, beyond the registered capital of £50,000.

NEW COMPANIES

Mayview Plastic Finishing Co. Ltd. (655,192).—April 4. Capital: £100 in £1 shares. The directors are: Henry Martin and Mrs. Eileen H. Martin, both of "Mayview," York Road, Rayleigh, Essex. Reg. office: "Mayview," York Road, Rayleigh, Essex.

H.C. Plastics Ltd. (655,796).—April 7. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in leather cloth, plastic materials, etc. The directors are: Benjamin Marsh and Anne Marsh, both of 11 Bryan Avenue, N.W.10; Laurence Kass, 51 Southwold Mansions, Widley Road, W.9. Reg. office: 9 Staple Inn, W.C.1.

Midafoam (Plastics), Ltd. (655,805). — April 7. Capital: £100 in £1 shares. The directors are: Harry Mitchell, 86 Shoot Up Hill, N.W.2; Robert L. Davies, 24 Albany Road, Hornchurch. Reg. office: 180 Bethnal Green Road, E.2.

Plastikair Ltd. (655,886). — April 7. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in plastics, etc. The first directors are to be appointed by the subscribers. Secretary: Solomon Leff. Reg. office: 180 Bethnal Green Road, E.2.

B. H. Phillips Ltd. (654,919).—April 1. Capital: £1,000 in £1 shares. To carry on the business of merchants of and dealers in rubber, rubber chemicals, plastics and allied materials, etc. The permanent directors are: Benjamin H. Phillips and Joyce E. Phillips, both of 22 Southbourne Close, Pinner, Middlesex. Reg. office: Evelyn House, 62 Oxford Street, W.1.

Racefield Manufacturing Co. Ltd. (657,377).—April 26. Capital: £100 in £1 shares. To carry on the business of manufacturers of and distributors of raincoats, mackintoshes, etc. The directors are: George Race-Stubbs and Ada Race-Stubbs, both of 28 Victoria Road, Northwich, Ches.; Norman Nicholls and Joy B. Nicholls, both of 7 Park Lane, Hale, Ches. Reg. office: 196 Deansgate, Manchester, 3.

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Written applications to Technical Director, Revertex, Ltd., Harlow, Essex. (294)

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(continued)

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invites applications for a senior position in its technical service group. Applicants should have a wide experience of dry rubber technology and good technical qualifications. Salary within the principal officer grade of £1,525-£2,065 per annum, with children's allowance where applicable and superannuation under the F.S.S.U. scheme.

Applications, which will be treated confidentially, should be made to The Director of Research, B.R.P.R.A., 56 Tewin Road, Welwyn Garden City, Herts., who will be pleased to discuss all aspects of this appointment with suitable applicants. (269)

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(continued)

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NIGHT-SHIFT foreman for injection moulding plant. All applications will be treated in the strictest confidence.—Write stating full details of experience and salary required to A. F. Grover and Co. Ltd., Higham Road, Chesham, Bucks. (301)

RUBBER technologist, aged about 25, with sound technical background, required by The Dayton Rubber Co. Ltd., Dundee. Up-to-date knowledge of synthetics and some experience of rollers desirable.—Apply with details of education and experience to the Chief Chemist. (292)

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PERSONNEL MANAGER. (305)

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TWO 40in. x 16in. Iddon mixing mills with motor and starter, magnetic breaking, cheap.—'Phone: Birmingham, East 3638. (302)

ARTICLES WANTED

6d. a word, Minimum 12/6 Box 2/-

MELLOR Equipment Ltd., Springfield Lane, Salford 3, buy used machinery of Francis Shaw and Joseph Robinson manufacture.—Telephone: Manchester, Blackfriars 1866. (271)

METAL beach shoe formers, all sizes.—Prices and details to G. W. Peters, Latex Products, 72 Market Street, Cheltenham. (300)

ARTICLES WANTED

(continued)

PLASTIC scrap. We buy anything for the best price.—C. R. Plastics, 110 Marlborough Road, N.19. ARC 2881. (303)

RUBBER extruder required, second-hand, three to four inches.—Price and details to Box 308. (308)

WANTED. Cured and uncured drab or white waste and uncured or semi-cured black compound tyre tread buffings and strippings and all plastic scrap.—Box 261. (261)

WANTED. Hilgar or other make, second-hand inspection enlarger with 10 x and 20 x lens.—Full details to Box 278. (278)

ARTICLES FOR SALE (SECONDHAND)

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FOR sale. Hilgar universal tool room projector with many accessories, as new.—Details from Box 279. (279)

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PVC extrusions for the trade.—Esco (Rubber) Ltd., 34/36 Somerford Grove, London, N.16. (80)

PVC sheeting scrap, all types, colour sorted and mixed, regular quantities available.—Michael S. Stevens Limited, Station Works, 75c Upper Richmond Road, Putney, London, S.W.15. (Vandyke 6925). (296)

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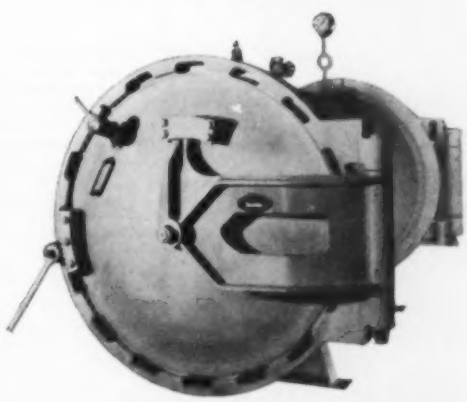

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